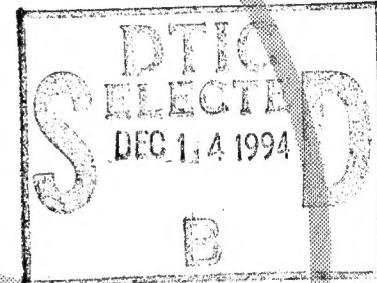


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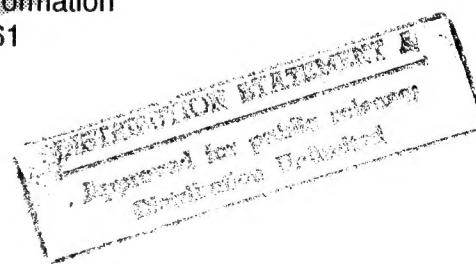
A NASPAC-Based Analysis of the Delay and Cost Effects of the Western-Pacific Region Preliminary Resectorization Effort of 1993

Joseph M. Richie
Douglas Baart



November 1994
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16. Abstract This report contains the findings and analysis of the effects of the Western-Pacific Region (AWP) Preliminary Resectorization Plan of 1993 on local (AWP airports) and system-wide traffic delays. The National Airspace System Performance Analysis Capability (NASPAC) was used to perform this task, and calculates the local and system-wide delays with and without the AWP Resectorization Plan. Cost of delay was derived using the Cost of Delay Module based on these delays, on passenger cost, and on airline and aircraft specific cost. The results indicate that the proposed resectorization will reduce the operational delay in years 1995 and 2000 at most AWP airports and system-wide with the maximum benefit occurring in the year 2000. On the other hand, resectorization does not favor the passengers for the future years modeled. However, in year 2000, the increase in passenger delay is less than for year 1995.			
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EXECUTIVE SUMMARY

INTRODUCTION

The objective of this study is to measure the performance of the Western-Pacific Region's (AWP) preliminary Resectorization Plan of 1993. The analysis determines the differences in the operational benefits for the years 1995 and 2000, system-wide and at AWP airports.

METHODOLOGY

The National Airspace System Performance Analysis Capability (NASPAC) was used to simulate the effects of the AWP preliminary Resectorization Plan of 1993. Annualization techniques were used to produce annual results. The AWP airport capacity estimates were provided by Los Angeles ARTCC (ZLA)-530, and Oakland ARTCC (ZOA)-530 for the purpose of this study.

The principal output from the model is throughput and delay for each of the 58 airports modeled, including fixes, sectors, and restrictions. The model also provides system-wide totals and averages of the throughput and delay, and converts the delay into cost using the Cost of Delay Module.

This analysis provides a delay and cost estimate of the proposed AWP Resectorization Plan system-wide and at local airports. This was done by simulating operations at ZLA and ZOA with current and future capacity estimates, new sector designs for the high and low altitudes, new arrival and departure fixes, reversing traffic between Los Angeles Basin and the San Francisco Bay Area, and the proposed routes to and from the east and northeast of Los Angeles airports.

The NASPAC Simulation Modeling System (SMS) was used to simulate future airspace operations. For the annualization results, 6 days in the year 1990 were selected based on the overall weather conditions in effect in the National Airspace System (NAS) for those days. Air traffic demand profiles generated at each of the 58 modeled airports were derived from the 1991 Terminal Area Forecasts (TAF) up to the year 2005.

The model produces two types of delay, one is the operational (technical) delay which affects the industry, and the other is the passenger arrival (effective) delay which affects the passengers. Operational delay occurs when an aircraft has to wait to use an Air Traffic Control (ATC) resource such as a runway or a fix. Passenger arrival delay, on the other hand, measures the difference between the actual time an aircraft arrives at the gate in the simulation and its scheduled arrival time. This delay shows the lateness of an aircraft, and is carried from one leg to another.

RESULTS

With the AWP preliminary Resectorization Plan of 1993 implemented, the results of the simulation have shown that the operational delay at most of the AWP airports would be reduced for the time frame modeled.

The Plan also provides system-wide benefits in the operational delay.

The simulation results show an increase in the passenger arrival delay at all of the AWP airports for both 1995 and 2000, except at LAS in 2000, where it shows a slight reduction. See appendix A for airport ID's.

The system-wide passenger arrival delay, as well as the cost, increases accordingly.

CONCLUSIONS

The AWP Resectorization Plan, with the current design modeled in this study, will benefit only the industry.

In 2000, LAX clearly shows the most benefit with a total of 17,829 hours reduction in operational delay or 26.4 percent, followed by SFO with 2,631 hours or 5.1 percent, ONT with 154 hours or 4 percent, and SJC with 491 hours or 2.3 percent. The Plan clearly does not benefit OAK in 1995 or 2000.

In 2000, the system-wide benefit breakdowns are 1.4 percent in airborne delay, and 2 percent in ground delay. The total operational delay reduction will be 1.7 percent, compared to .8 percent reduction in 1995.

The airports that have the highest traffic volume show the largest passenger arrival delay increase, such as LAX, SFO, and SNA. The preliminary Resectorization Plan of 1993 will benefit LGB more in 2000, which is a pattern also observed in the operational delay for the same time frame modeled.

The passenger arrival delay cost will increase by \$634,000,000 or 16 percent in 1995 with the Plan. In 2000, the cost estimates show an increase of \$505,000,000 or 8 percent. These values represent the differences between the baseline and the resectorization cases for the years modeled.

As far as the operational delay is concerned, the results show that the Plan will provide benefits to most of the AWP airports for the time frame modeled, with maximum benefits occurring in 2000. The Plan does not favor the passengers, but in the year 2000, passenger delay decreases by 49 percent at LAX and 20 percent at SAN compared to 1995.

1. INTRODUCTION.

The Federal Aviation Administration's (FAA) Western-Pacific Region (AWP) recently completed a study by the Resectorization Committee, ZLA-3A5 [1] on internal resectorization. The main goal of this study was to improve airspace efficiency. Initial indications suggest that internal resectorization will improve the local airspace traffic flow, increase system capacity, and enhance National Airspace System (NAS) performance. The title of the study is the AWP Preliminary Resectorization Plan of 1993, to differentiate it from any future studies. It will be referred to in the rest of this report as the AWP Resectorization Plan.

The AWP Resectorization Plan's success depends on the modification of existing major traffic routes. The basic Plan calls for an agreement with the adjacent facilities to redesign the high and low altitudes. Additional sectors will be created by dividing existing sectors.

These enhancements are designed to alleviate the existing congestion problems caused by inadequate airspace capacity, unbalanced sector load, terminal airspace constraints, military special operating areas, inefficient handling of high performance turboprop aircraft, traffic management, and the limited track capacity of the LAX and SFO Automated Radar Terminal Systems (ARTS) IIIA. Please see appendix A for a list of AWP airports and their IDs.

The difficulties encountered in designing routes into and out of Los Angeles Air Route Traffic Control Center (ARTCC) (ZLA) are due to the limitation of the airspace caused by mountainous terrain and extensive military special use airspace. Due to these limitations, several bottle necks have developed. For example, the traffic between SAN/LAX and OAK Bay Area Airports has to climb and descend head-on with traffic over Avenal (AVE) Very High Frequency Omni-directional Radio Range with tactical air navigational aid (VORTAC). The LAX northeast-bound departures climbing over Daggett (DAG) have to be squeezed between R2508 Complex and opposite direction traffic descending (arrivals) to LAX over Hector (HEC). All LAX/ONT arrivals from the east are descended and sequenced over Twentynine Palms (TNP)/Palm Springs (PSP) head-on to northeast-bound climbing LAX/SAN departures, and eastbound SAN departures climbing head-on with SAN arrivals from the Southeast between active restricted areas along J2.

The Resectorization Committee developed three northbound and three southbound one-way destination-specific routes along the Bay Area/LAX corridor. Figure 1 shows ZLA-proposed jet route arrivals, and Figure 2 shows ZLA-proposed jet route departures. The arrival traffic over HEC was moved into the TNP/PSP arrival

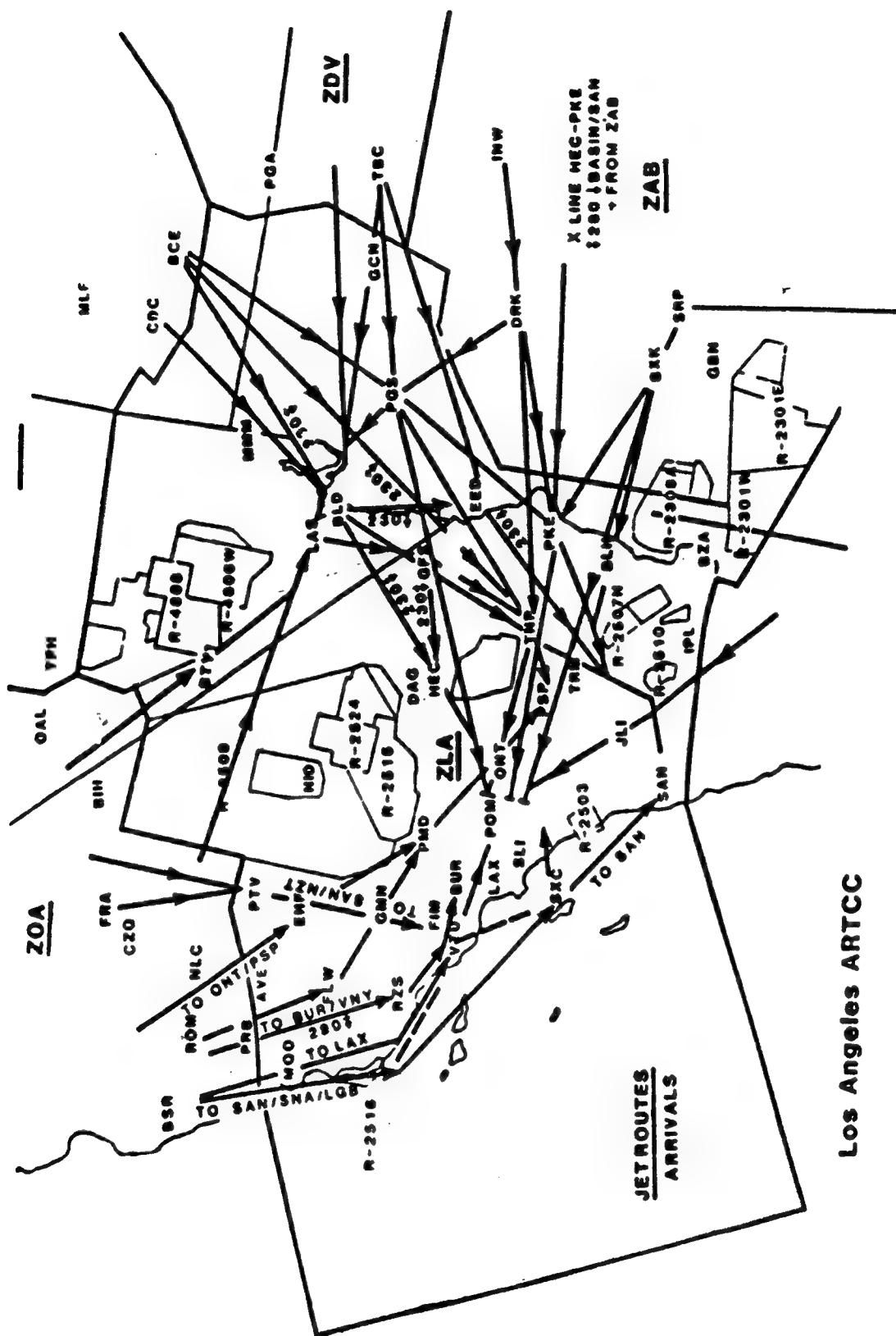


FIGURE 1. LAX JET ROUTE ARRIVALS

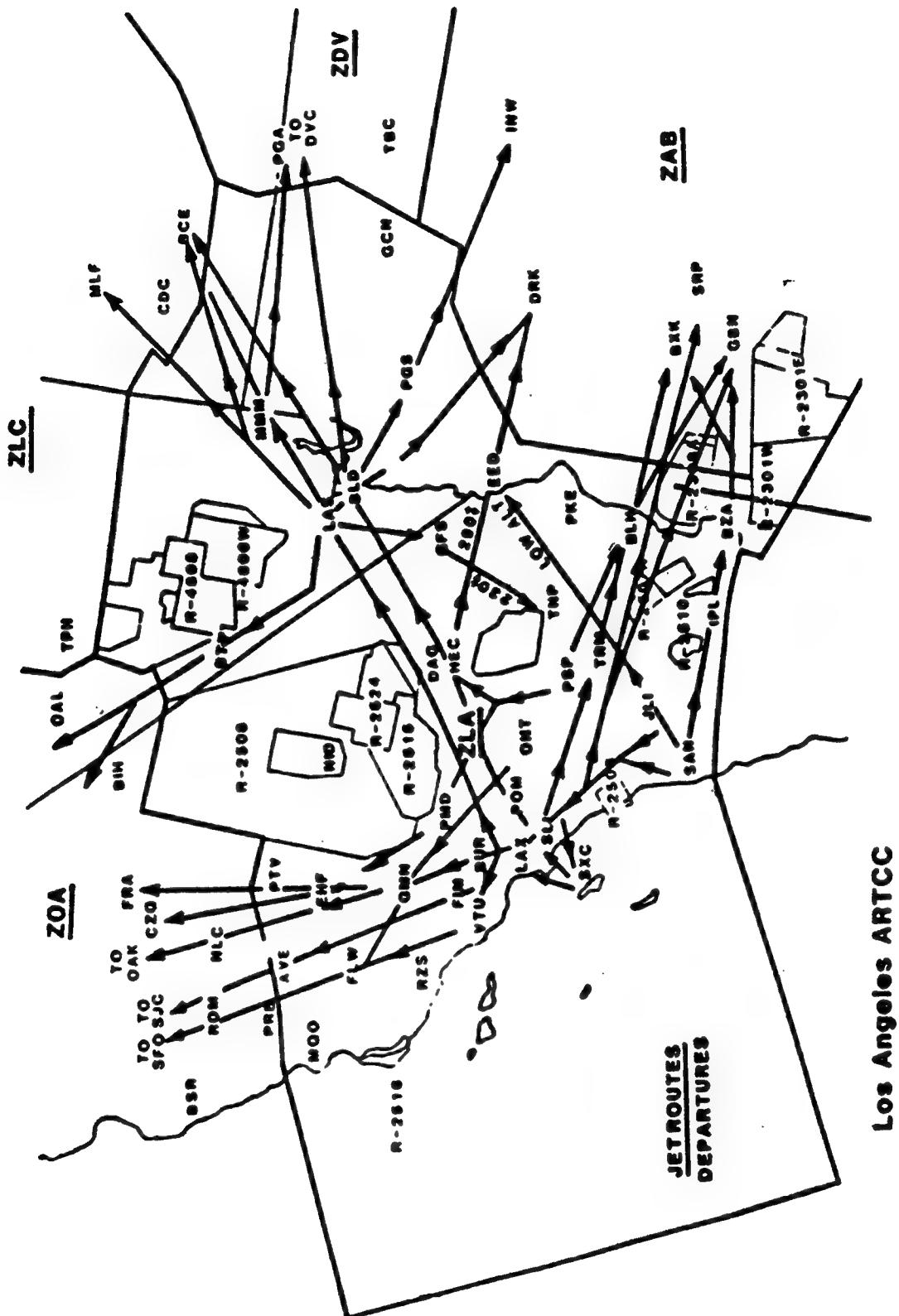


FIGURE 2. LAX JET ROUTE DEPARTURES

flow to accommodate parallel outbound tracks over DAG/HEC and points northeast. To eliminate the head-on climbing/descending conflict in the TNP/Needles (EED)/Parker (PKE) areas, all eastbound traffic was routed via LAX DAG/HEC or Oceanside (OCN)/Imperial (IPL) eastbound. The SAN arrival traffic from the east on J2 was moved north into the westbound flows over Blythe (BLH)/J212, to be sequenced into a single inbound track from the northeast. All LAX arrival traffic from the east/northeast would be segregated into two or three one-way inbound tracks over TNP/PSP/Thermal (TRM).

The National Airspace System Performance Analysis Capability (NASPAC) Simulation Modeling System (SMS) was used in the study. NASPAC is used by the FAA as a tool to evaluate the local effects and system-wide performance of the NAS. It is used to evaluate changes in procedures, such as restructuring routes of the Air Traffic Control (ATC) system. NASPAC can also be used for strategic planning, for identifying bottle necks in the system, and for evaluating alternative solutions for capacity and demand related issues. In addition to identifying delay, monetary evaluations may be made by converting delay into cost estimates, and the estimated number of passengers affected by the change may be addressed.

ZLA-3A5 will use the results of the NASPAC study to derive local and system-wide benefits in support of the AWP Resectorization Plan.

1.1 BACKGROUND.

The NASPAC study was conducted using six phases presented by the ZLA-3A5. Figure 3 shows the new layout of the ZLA high altitude areas, and figure 4 shows the low altitude areas. The six phases are:

1. Relocation of Sector 12.
 - (a) Relocation of "Sector 12" from Area C to Area B
 - (b) Area C split "Sector 40", creating "Sector 29"
2. Relocation of Area E Sectors.
 - (a) Sectors 30, 21, and 22 realign to two sectors, all altitudes
3. San Diego Reverse Flow.
4. Northwest (Areas A & B) Reverse Flow.
5. Implement DAG/HEC Parallel Departure Routes and BUR East Arrival Routing.

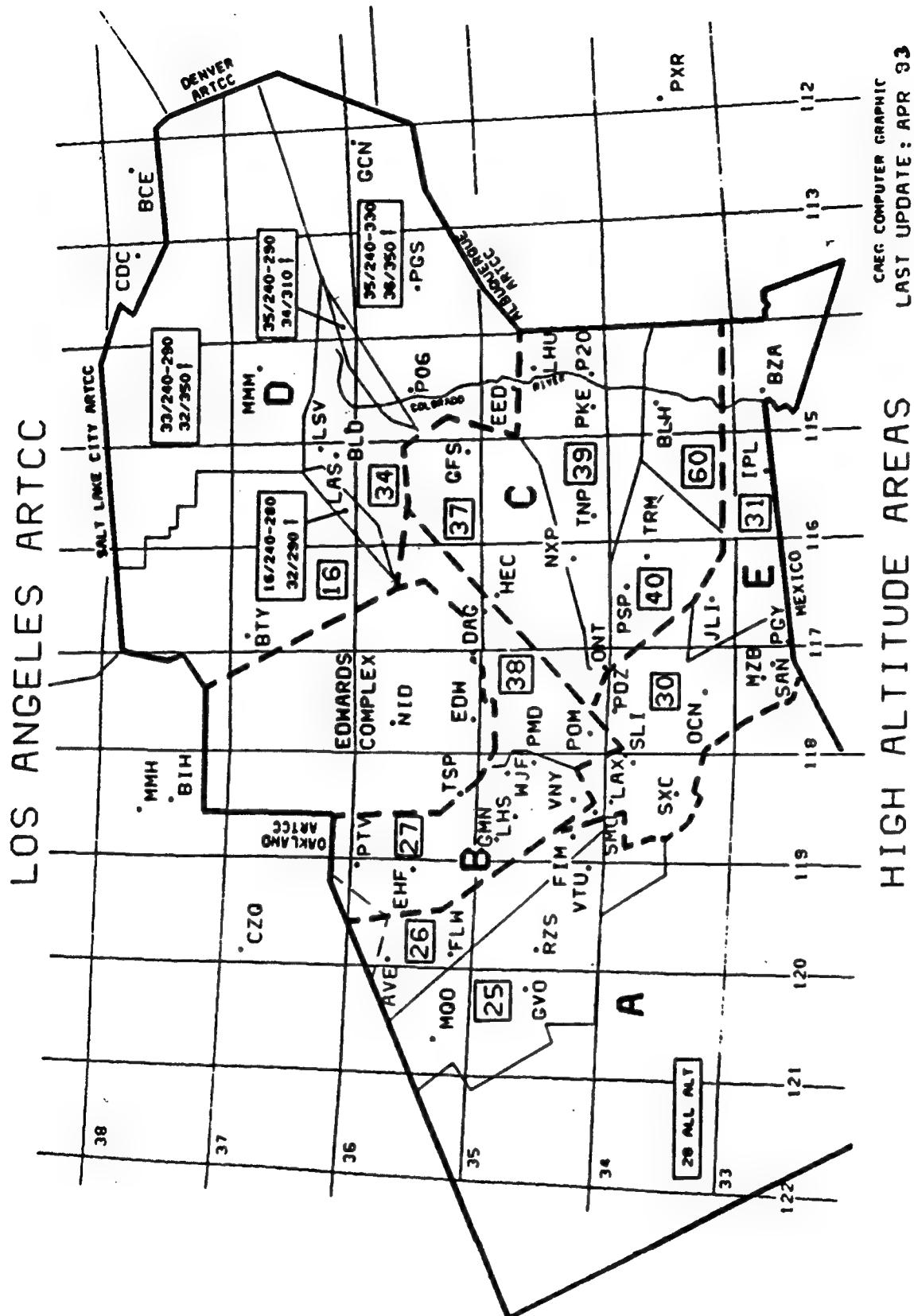


FIGURE 3. ZLA HIGH ALTITUDE NEW SECTOR LAYOUT

LOS ANGELES ARTCC

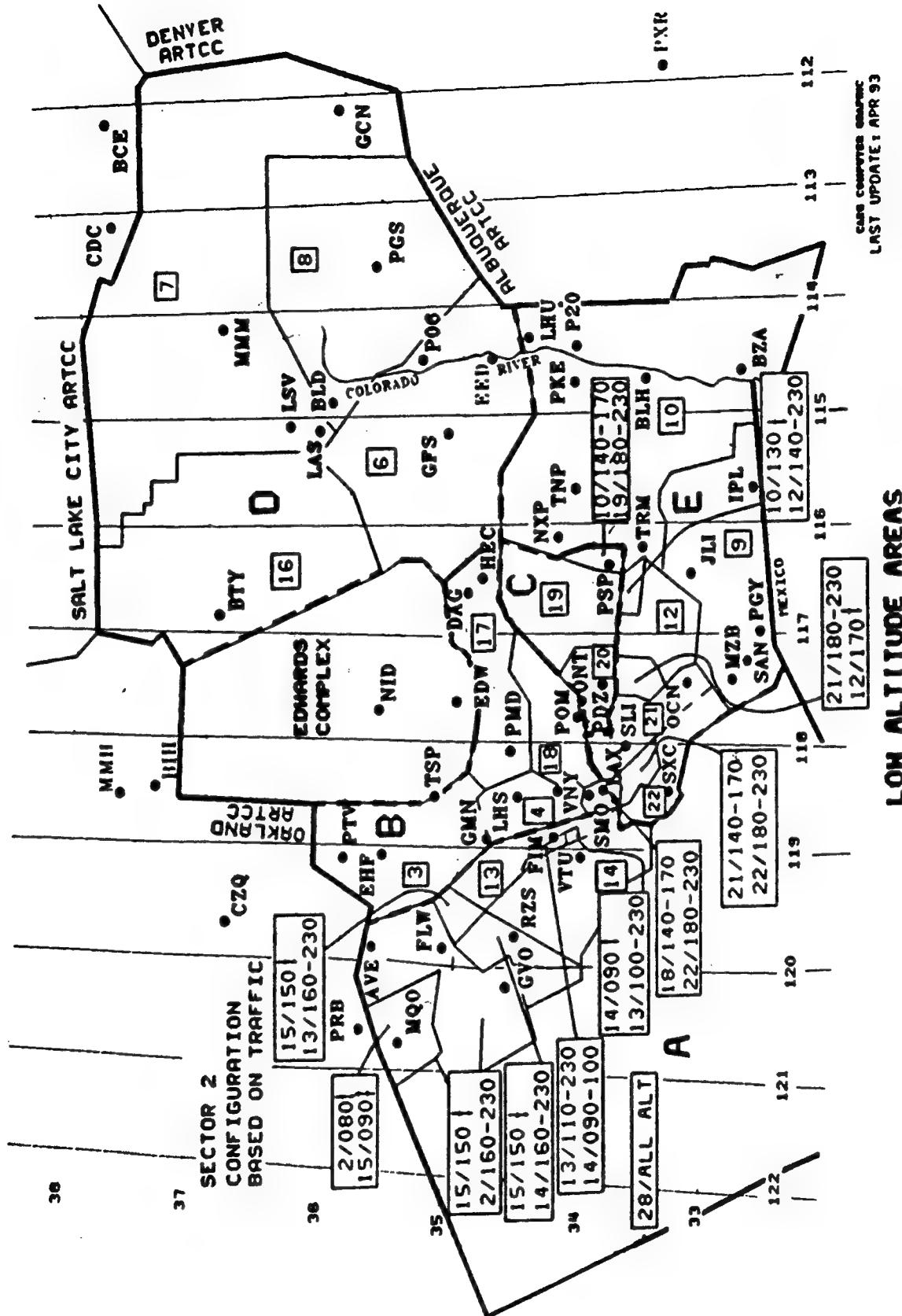


FIGURE 4. ZLA LOW ALTITUDE NEW SECTOR LAYOUT

6. LAX Dual Flow from East and Elimination of TRM PKE Drake (DRK) Departure Routing.

Area A contains sector 28 which is ZLA's most western sector, lying entirely over the Pacific Ocean. Operations at this sector are unique, since it is here that oceanic traffic makes its transition from non-radar coverage to domestic radar control. Controllers working this sector coordinate closely with ZOA. These controllers ensure that non-radar separation standards are maintained between aircraft making transition from the mainland, to and from Hawaii, and various destinations in the South Pacific track system. These are established oceanic tracks and random routes under sector 28 jurisdiction which make traffic control very difficult. Under the AWP Resectorization Plan, ZLA will retain sector 28 airspace to about 50 miles offshore; the rest of sector 28 will be allocated to ZOA.

Current operating procedures for controlling air traffic between the San Francisco Bay Area and the Los Angeles Basin include the current West Coast Plan which accounts for 95 percent of the mode of operation. As a result, this is the only plan modeled in this study. The Southeast Plan accounts for 5 percent when weather patterns dictate changes to arrival and departure streams. This corridor of airspace is one of the most heavily travelled in the world.

Forecasts of the demand for LAX and SFO and their surrounding airspace project a significant increase in traffic by the year 2000. In January 1991, a task force composed of representatives of ZLA, ZOA, Southern California TRACON, and the AWP convened to develop a plan to deal with the predicted traffic growth and the congestion problem that exists today.

The airspace design and traffic flows of the ZLA are currently outdated, and revisions are continual to accommodate changes in the system. The accumulation of these short-term fixes has resulted in an inefficient use of the airspace with little room for growth.

Optimal airspace utilization is limited by the close proximity of several major airports. In addition, the airspace congestion stems from the Special Use Airspace (SUA) parcel between the San Francisco Bay Area and the Los Angeles Basin. A different routing in this area might reduce delay to area airports and balance sector loads.

Currently, ZOA can accept a limited number of the SFO and OAK departures into the high altitude stratum between the San Francisco Area and Los Angeles Basin. Delay incurred by the users at SFO and OAK are caused by the En route Spacing Programs (ESP) designed to feed the only north-to-south jet route available over Fillmore (FIM) VORTAC. An additional north-to-

south jet route could possibly alleviate much of the congestion present in the inland route system. A north/south corridor airspace structure between the Los Angeles Basin and San Francisco Bay Area is being proposed. Traffic would be directed in a "racetrack" direction; therefore simplifying present traffic flows.

1.2 STUDY PURPOSE AND OBJECTIVES.

The study analyzes the current and proposed route changes, as outlined in the AWP Resectorization Plan, and provides a delay and cost estimate at the system-wide and airport level. To accomplish this task, operations were simulated, using the 1991 Terminal Area Forecasts (TAF) (FY 1991-2005)[2], at ZLA and ZOA with:

- a. current and future capacity estimates.
- b. new sector designs for the low and high altitudes.
- c. new arrival and departure gates.
- d. 2005 traffic demand.

The study was conducted at the request of AWP and approved by the FAA's Operations Research Service, AOR-1. The study was done for the ZLA Resectorization Program Office, ZLA-3A5 and Civil Operations, ATM-100, under the sponsorship of System Analysis Division, AOR-100.

The FAA Technical Center's ATC Technology Branch, ACD-340, conducted the study using the NASPAC SMS. The final results are analyzed and presented in this report for the AWP ZLA Resectorization Committee.

2. TECHNICAL APPROACH.

This section provides a brief overview of the NASPAC modeling system and describes the system metrics, scenario definitions, Cost of Delay Module, and the assumptions and caveats used in this study.

2.1 NASPAC SIMULATION MODEL.

NASPAC is a tool used by the FAA to analyze the impact of proposed operational and capital improvements on the performance of the NAS. It is an event-step discrete simulation model that tracks the progress of each aircraft in the system as they compete for and use ATC resources. NASPAC simulates system-wide performance and provides a quantitative base for decision making related to system improvements. The model supports strategic planning by identifying air traffic flow congestion problems and examining solutions to capacity, demand, and procedural related issues. NASPAC has been used to analyze the interaction among

components of the airspace system, and how the system reacts to projected demand and capacity changes.

NASPAC is a macro model used to estimate system-wide impacts of an ATC-proposed change. Traffic profiles consist of scheduled and unscheduled arrivals and departures for the 58 major airports in the system. Appendix A contains a list of these 58 airports and their ID. These are 50 of the nation's busiest airports and 8 other associated airports. Capacities at these 58 airports are modeled as hourly arrival and departure rates for both instrument flight rules (IFR) and visual flight rules (VFR). Scheduled demand is derived from the Official Airline Guide (OAG) and is used for predicting future growth. Unscheduled demand is derived from daily and hourly distributions taken from real world data (tower count). When using these distributions, the model randomly selects unscheduled flights for inclusion in the hourly airport arrival and departure demand. The projected traffic growth is provided by the TAF.

Among the major descriptive parameters used by the model are airport acceptance rates (AAR). Two servers are used at modeled airports; one handles arrivals and the other, departures. Each modeled airport requires two sets of values. The first represents an arrival priority strategy, and it consists of the maximum arrival rate (ARR) and its corresponding minimum departure rate (MDR). The second set represents a departure priority strategy. It consists of a maximum departure rate (DEP) and minimum arrival rate (MAR). When there is a high demand for arrivals and a low demand for departures, an arrival priority is used. The opposite will hold true when there is a high request for departures and a low request for arrivals. If the demand is between two extremes, the model calculates the service time using the ratio of the current arrival and departure queue lengths. This ratio determines the values on the capacity curve at which the servers operate.

2.2 NASPAC SIMULATION SYSTEM MEASURES.

NASPAC's key metric of performance is delay. The model calculates delay for each flight in the system, and aggregates throughput and delay for each of the 58 modeled airports. In addition, arrival and departure fixes, en route sectors, and restrictions are other modeled resources that measure delay. System metrics summarize every type of delay measured in the model.

The two types of delay that the model provides are technical (operational) and effective (passenger) delay. Technical delay is the type of delay absorbed by aircraft as they wait to use ATC resources such as runways, and fixes. Passenger delay is the difference between the scheduled arrival times published in the OAG and actual arrival times recorded in the simulation.

Operational delay is composed of arrival and departure delay. Operational arrival delay accumulates when an aircraft has arrived in the terminal area of an airport and has to wait to use a runway. Operational departure delay accumulates when an aircraft is ready to depart, but has to wait for an available runway. Sector entry delay occurs when the instantaneous aircraft count or hourly aircraft count parameters for a given sector is exceeded. An aircraft that arrives on time and accumulates no passenger delay can still accrue operational delay. Monetary assessments are estimated by converting delay into cost to the users and consumers by applying the NASPAC Cost of Delay Module. The Cost of Delay Module was incorporated into NASPAC SMS R3.1 and was used to conduct this study.

Metrics used in this study to analyze the impacts of the Resectorization Plan on the AWP and the NAS as a whole are:

1. Passenger delay
2. Operational delay
3. Throughput at airports
4. Sector throughput
5. Changes in air traffic procedures (ripple effect)
6. Cost of delay
7. Enplanements.

2.3 COST OF DELAY MODULE.

The Cost of Delay Module [3] was used to translate the delay incurred in the simulation into cost metrics in order to determine cost to the airline, and to the passengers. This study used the most recent data available, provided by the Office of Airline Statistics, Data Administration Division, DAI-20, using Form 41 as a means of obtaining operational and passenger costs. The U.S. Department of Transportation (DOT) requires all the airlines to report their cost data to DAI-20 on a quarterly basis.

The cost of delay module breaks down this data into airborne and ground delay cost by carrier and aircraft type. Operational cost consists of crew salaries, maintenance, fuel, equipment, depreciation, and amortization. Passenger delay measures the difference between the OAG scheduled arrival times and the arrival times measured by the simulation model. This metric measures the cost to passengers as a result of lost time due to delay. For example, the savings in cost would be the time savings to passengers realized from the reduction in passenger delay. The cost of passenger delay is a constant derived by the Office of Aviation Policy and Plans (APO-1), Economic Analysis Branch, APO-220. The constant (\$40.50/hour), used in the Cost of Delay Module, measures the cost per hour of a delay incurred by a passenger. Passenger costs are derived from the expected number of passenger on a flight, times \$40.50, times the number of hours

of delay absorbed by all passengers aboard a flight. The estimated number of passengers aboard each flight is a function of aircraft type. Form 41, Origin and Destination Survey (O&DS), was used to determine aircraft occupancy values.

The NASPAC model produces a delay trace file for every simulation run. This file contains information pertaining to the delay type, time of delay, where the delay occurred, and a tail number which uniquely defines the aircraft carrier, aircraft type, and the magnitude of the delay that was simulated. The model defines the type of delay (airborne, ground, or passenger) and references the appropriate cost of that delay from an operational cost data base, based on the carrier and aircraft type. Operational airborne, operational ground, and passenger delay are treated as separate entities, each contributing to the total delay cost accumulated in the simulation. For example, if American Airlines (AA) flight 2234 type B-727 experiences an airport arrival delay of 3 minutes, the module will define the operational cost of an airborne delay for AA type B-727 and multiply that number by 3. This is done for every type of operational delay occurring during the simulation. A report file is generated from the cost module summarizing cost estimates by delay type, air carrier, general aviation, military operations, and an estimate of missing cost information.

2.4 SCENARIO DEFINITIONS.

Scenarios used in this study are defined by several variables such as weather, airspace geometry, routes, new procedures, time-frame, capacity, and demand. Six different weather scenario days were used to model the changes. The first is based on weather observed on January 13, 1990, when most of the country was under Visual Meteorological Conditions (VMC), for 95-100 percent of the day. Under these conditions, all airports, including the West Coast, were at or near their maximum capacities. The second day's weather is similar to March 10, 1990, when most of the system was under VMC for 80-85 percent of the day, and the capacity of some airports was reduced by 15 percent due to weather conditions. The third day is the second most severe of the six days selected, with weather similar to March 31, 1990, when most of the system was under VMC for 70-80 percent of the day, and the capacity of some airports was reduced 20 percent due to weather conditions. The fourth day's weather is similar to May 16, 1990, when most of the system was under VMC for 85-90 percent of the day, and the capacity of some airports was reduced by 10 percent due to weather conditions. The fifth day has weather similar to September 27, 1990, when most of the system was under VMC for 90-95 percent of the day, and the capacity of some airports was reduced by 5 percent due to weather conditions. The sixth day was the most severe day selected, with weather similar to December 22, 1990, when most of the system was under VMC less than or equal to 70 percent of the day, and the capacity

of some airports was reduced by at least 30 percent due to weather conditions. The weights provided in Table 1 were used to annualize the results, such as delay and cost estimates.

Capacity estimates at the AWP airports, and the other modeled airports, are influenced by weather conditions. This is due to the limitation of the runway configuration enforced during periods of poor weather conditions. VMC provides the maximum capacity, mainly because of the use of visual approach procedures. The capacity decreases under IMC because arriving aircraft must use instrument approaches resulting in an increase of in-trail separation. Depending on the severity of weather conditions, capacity is also decreased due to the inability of the arriving traffic to run simultaneous approaches at some airports.

The definitions of the scenarios also include the selection of a time frame and the improvements studied. The following five cases were analyzed:

- a. 1991 with present AWP airports demand and present capacity (baseline).
- b. 1995 with future demand and present capacity (no resectorization) at the AWP airports.
- c. 1995 with future demand and Resectorization Plan in place.
- d. 2000 with future demand and present capacity (no resectorization).
- e. 2000 with future demand and Resectorization Plan in place.

Table 1 shows the scenario design of the study in a 6 X 5 matrix. The left hand column represents the weather days modeled, and the column headings indicate the years modeled including the 1991 baseline, as well as the years 1995 and 2000 with and without the Resectorization Plan.

The X's represent the details for each scenario, including capacity, future demand, Estimated Departure Clearance Times (EDCT's) ground delay programs, and airspace route structure. These improvements were modeled by changing the airport capacities at LAX, OAK, SFO, and the satellite airports, and by revising the arrival and departure fix attributes, as well as the sector load. The weights applied were used for evaluation of the impact of the Plan for an entire year. Each weight represents the number of days in 1990 the NAS had experienced similar weather to that of the days modeled.

TABLE 1. SCENARIO STRUCTURE

% IN VMC	WEIGHTS APPLIED	SCENARIO DAY	1991 BL	1995 NI	1995 RESC	2000 NI	2000 RESC
95-100	80.00	JAN 13	X	X	X	X	X
90-95	127.50	SEP 27	X	X	X	X	X
85-90	86.25	MAY 16	X	X	X	X	X
80-85	23.75	MAR 10	X	X	X	X	X
70-80	17.50	MAR 31	X	X	X	X	X
<70	30.00	DEC 22	X	X	X	X	X

BL - baseline

NI - no resectorization

Resc - resectorization

NOTE : 1. Scenario days represent varying levels of IMC and VMC,

2. Weights used to compute annual results, assuming frequency of occurrence of similar days in a given future year.

The study focused on modeling the baseline (1991) operations, as well as the future operations for 1995 and 2000 at ZLA and ZOA, with respect to the traffic flow between the San Francisco Bay Area, the Los Angeles Basin, and OAK. Currently, weather conditions dictate that the West Coast Plan is used 95 percent of the time, with the Southeast Plan being implemented approximately 5 percent. As a result, only the West Coast Plan was modeled, with the current traffic flow reversed 180 degrees.

In this study, more emphasis was placed on the operational delay to measure the performance of AWP airports and the NAS, as a whole. Operational delay is the type of delay that accumulates when an aircraft has to wait in the system to use a resource. This type of delay is unlike passenger delay since it represents the delay generated by the actual demand placed on the system, and not by the users.

2.5 NASPAC WEATHER ANNUALIZATION.

The method used for computing annual results of this study was developed by the MITRE Corporation. Six scenario days were selected as representative of varying levels of VMC and IMC across the 58 modeled airports in the simulation. To compute the annual results, weighting factors for each scenario day were applied to reflect the relative frequency of occurrence of that day's VMC throughout the year. Table 1 lists the six days used in the NASPAC SMS weather annualization process with its percentage of visual conditions, and the relative weight used to annualize simulation results.

2.6 ASSUMPTIONS AND CAVEATS.

This study assumes that the AWP Resectorization Plan is in place, as presented by the ZLA Resectorization Committee. It also assumes that all the connecting points with the adjacent centers have been approved, including the reverse flow between ZLA and ZOA.

The standard VFRs at AWP airports vary. The following list indicates these requirements:

AIRPORT	CEILING AT MSL	VISIBILITY
BUR	3,500 feet	3 miles
LAX	2,000 feet	3 miles
LAS	5,000 feet	3 miles
LGB	2,000 feet	3 miles
OAK	2,500 feet	3 miles
ONT	3,000 feet	3 miles
SAN	2,500 feet	3 miles
SFO	2,500 feet	3 miles
SNA	2,500 feet	3 miles

Under IFR, all of the airport's ceiling and visibility is less than VFR.

The ceiling and visibility at any given airport determines the capacity for that airport. For example, in a previous NASPAC study at DFW under VMC, the maximum capacity (arrival/departure) is 296 [4] aircraft with all 5 runways operational. This is based on the acceptance rate of 160, that is, the number of arriving aircraft accepted in 1 hour. Under IFR, the maximum capacity is 180 aircraft, based on an acceptance rate of 100 aircraft per hour.

The 1991 TAF were used to project future growth. These forecasts depend on many factors which are subject to change, such as economics and advanced technology. The annualization method used for all the time frames modeled is an approximation, and is based on weather observations taken from the year 1990. The future year's weather observations are assumed to follow the same patterns as 1990. The model does not include re-routing or other methods used to minimize the impacts of adverse weather, nor does it address noise abatement or safety. All of the airport capacity estimates used in the analysis for the years 1995 and 2000 were based solely on airport improvements projected in the National Plan for Integrated Airport System (NPIAS). The EDCT's used in the simulation are estimates based on the model's acceptance rate. Table 2 displays all airport improvement projects expected to be completed by the year 2005.

NASPAC SMS contains stochastic elements that cause slight differences in results between runs with otherwise identical input. To capture the stability of these elements, three model runs were averaged.

3. METHODOLOGY.

This section describes the procedural details of the study and gives the sources of the capacity and future demand data. The method of modeling the changes to the airspace is described, followed by a discussion of the cost estimation used.

3.1 CAPACITY.

AWP airport and sector capacity values used in this study were provided by AWP-530, ZLA-530, and ZOA-530. These values are based on discussions with the towers, ZLA, ZOA, Southern California TRACON, and other experts in the field who control the West Coast traffic on a daily basis. The 1988 FAA Engineering Performance Standards (EPS) were also used as a reference, along with the FAA Airfield Capacity model [5]. The capacities used represent the maximum, minimum, and 50/50 mix of the hourly departure and arrival rates.

TABLE 2. AIRPORT IMPROVEMENTS MODELED TO BE COMPLETED 2005

<u>Airport</u>	<u>Type of Improvement</u>	<u>Specifics</u>
ATL	New runway	3,000 ft south (5th parallel).
BWI	New runway	10R/28L.
CLT	New runway	18W/36W, assume independent IFR.
CVG	New runway	18/36, assume independent IFR.
DEN	New Denver	airport. (DVX)
DFW	Two new runways	GA rwy 16/34, rwy 18/36.
DTW	Two new runways	9R/27L and 4/22.
FLL	Runway extension	9R/27L.
IAD	Two new runways	1W/19W and 12R/30L.
IAH	New runway	8L/26R.
MCI	Two new runways	1R/19L and 9R/27L.
MCO	New runway	17L/35R.
MEM	New runway	18L/36R.
MKE	Runway extensions	1L/19R and 7L/25R.
MSY	New runway	1L/19R.
ORD	Relocate	4L/22R and 9L/27R.
	Runway extensions	14L and 22L.
	Two new runways	14/32 (3rd parallel) 9R/27L (3rd parallel).
PHL	Relocate	9L/27R.
	New runway	8/26.
PHX	New runway	8S/26S (3rd parallel).
PIT	New runway	parallel, assume independent IFR.
RDU	New runway	5/23. Assume independent IFR.
SDF	Two new runways	17L/35R and 17R/35L (parallels).
SJC	Runway extension	12L/30R for air carrier operation.
SLC	New runway	16W/34W.
STL	New runway	12L/30R, 4,300ft from parallel.
SYR	New parallel runway	10L/28R.
TPA	New parallel runway	18/36.

The minimum departure capacity is the hourly departure rate when arrivals are given highest priority (arrival priority). Conversely, minimum arrival capacity exists when departures are at their maximum levels (departure priority). The minimum service time between successive arrival and departure is determined from these hourly rates and the queue lengths of the arrivals and departures. The inverse of these service times is the capacity values that are furnished for each of the 58 modeled airports. Table 3 shows AWP airport capacity values under VMC, and Table 4 shows the capacity values under IMC.

The future projections of capacity have also been estimated to reflect procedural and structural improvements outlined in the 1991-1992 Aviation System Capacity (ASC) Plan and are due for implementation by the year 2000 [6]. Procedural improvements

include approach procedures and reductions of separation minima. The structural improvements are comprised mainly of the addition of concrete, specifically new runways. Never the less, ZLA and ZOA felt that the capacities for all AWP airports should be the same for 1995 and 2000.

3.2 FUTURE DEMAND FORECASTS AND INPUT DATA.

The demand used in the model consists of unscheduled demand from historical data (tower counts at modeled airports) and scheduled demand derived from the OAG. The 1991 demand levels were used as a baseline for predicting future demand. The projected growth at all West Coast airports, and other airports in the NAS, were provided by the FAA's Office of Aviation Policy and Plans (APO) through the TAF 1991-2005. This file consists of air carrier and general aviation (GA) operations.

The model also accounts for ground delay issued by Central Flow Control Facility (CFCF). These are due to adverse weather conditions at the destination airport or any en route restrictions. The EDCT's are computed and appended to the schedule for each affected flight.

The unscheduled demand is described by daily and hourly distributions taken from real world data (tower count). The primary source of the IFR GA and military flights is the "Host Z" data. The data are collected by the ARTCCs and sent to the FAA Technical Center by satellite for each flight in the system. They are then sent to the Transportation System Center (TSC) for processing and distributed to CFCF and other users. The weather data used in the model were taken from surface observations at all of the modeled airports.

The TAF for demand at the West Coast airports (and other modeled airports) take into account the increase in capacity that accompanies airport expansion. Figure 5 shows the forecasted number of daily operations, system-wide. The growth between 1991 and 2000 without the AWP Resectorization Plan is based on the TAF (FY 1991 - 2005) [6] growth data. These values represent an estimated 14 percent growth from 1991 to 1995, and 22 percent growth from 1991 to 2000. Figure 6 shows the forecast number of daily operations at LAX and SFO. These values represent an estimated 12 percent growth between 1991 and 1995, and 19 percent between 1991 and 2000 at LAX. SFO has an estimated 20 percent growth between 1991 and 1995, and 35 percent between 1991 and 2000.

TABLE 3. AWP AIRPORTS CAPACITY UNDER VMC (VFR)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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BURBANK (BUR)

No Resectorization Baseline (1991)	Max A 42 Min D 38	Min A 23 Max D 55	A 40 D 40
Resectorization (1995)	Max A 42 Min D 45	Min A 25 Max D 65	A 41 D 41
Resectorization (2000)	Max A 42 Min D 45	Min A 25 Max D 65	A 41 D 41

LAS VEGAS (LAS)

No Resectorization Baseline (1991)	Max A 70 Min D 50	Min A 30 Max D 80	A 62 D 62
Resectorization (1995)	Max A 72 Min D 60	Min A 34 Max D 85	A 67 D 67
Resectorization (2000)	Max A 72 Min D 60	Min A 34 Max D 85	A 67 D 67

LOS ANGELES (LAX)

No Resectorization Baseline (1991)	Max A 81 Min D 52	Min A 40 Max D 90	A 70 D 70
Resectorization (1995)	Max A 85 Min D 60	Min A 45 Max D 100	A 75 D 75
Resectorization (2000)	Max A 85 Min D 60	Min A 45 Max D 100	A 75 D 75

TABLE 3. AWP AIRPORTS CAPACITY UNDER VMC (VFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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LONG BEACH (LGB)

No Resectorization Baseline (1991)	Max A 80 Min D 60	Min A 40 Max D 70	A 55 D 55
Resectorization (1995)	Max A 82 Min D 68	Min A 42 Max D 78	A 65 D 65
Resectorization (2000)	Max A 82 Min D 78	Min A 42 Max D 78	A 65 D 65

OAKLAND (OAK) (NORTH & SOUTH FIELDS)

No Resectorization Baseline (1991)	Max A 60 Min D 40	Min A 30 Max D 70	A 50 D 50
Resectorization (1995)	Max A 60 Min D 40	Min A 30 Max D 70	A 50 D 50
Resectorization (2000)	Max A 60 Min D 40	Min A 30 Max D 70	A 50 D 50

ONTARIO (ONT)

No Resectorization Baseline (1991)	Max A 47 Min D 38	Min A 25 Max D 50	A 40 D 40
Resectorization (1995)	Max A 49 Min D 45	Min A 28 Max D 55	A 44 D 44
Resectorization (2000)	Max A 49 Min D 45	Min A 28 Max D 55	A 44 D 44

TABLE 3. AWP AIRPORTS CAPACITY UNDER VMC (VFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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SAN DIEGO (SAN)

No Resectorization Baseline (1991)	Max A 34 Min D 30	Min A 20 Max D 45	A 32 D 32
Resectorization (1995)	Max A 36 Min D 38	Min A 22 Max D 50	A 37 D 37
Resectorization (2000)	Max A 36 Min D 38	Min A 22 Max D 50	A 37 D 37

SAN FRANCISCO (SFO)

No Resectorization Baseline (1991)	Max A 66 Min D 40	Min A 30 Max D 76	A 53 D 53
Resectorization (1995)	Max A 66 Min D 40	Min A 30 Max D 76	A 53 D 53
Resectorization (2000)	Max A 66 Min D 40	Min A 30 Max D 76	A 53 D 53

SAN JOSE (SJC)

No Resectorization Baseline (1991)	Max A 40 Min D 20	Min A 10 Max D 50	A 30 D 30
Resectorization (1995)	Max A 40 Min D 20	Min A 10 Max D 50	A 30 D 30
Resectorization (2000)	Max A 40 Min D 20	Min A 10 Max D 50	A 30 D 30

TABLE 3. AWP AIRPORTS CAPACITY UNDER VMC (VFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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ORANGE COUNTY (SNA)

No Resectorization Baseline (1991)	Max A 50 Min D 38	Min A 32 Max D 60	A 45 D 45
Resectorization (1995)	Max A 58 Min D 43	Min A 32 Max D 60	A 55 D 55
Resectorization (2000)	Max A 58 Min D 43	Min A 32 Max D 60	A 55 D 55

TABLE 4. AWP AIRPORT CAPACITY VALUES UNDER IMC (IFR)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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BURBANK (BUR)

No Resectorization Baseline (1991)	Max A 35 Min D 30	Min A 20 Max D 47	A 33 D 33
Resectorization (1995)	Max A 38 Min D 40	Min A 22 Max D 55	A 36 D 36
Resectorization (2000)	Max A 38 Min D 40	Min A 22 Max D 55	A 36 D 36

LAS VEGAS (LAS)

No Resectorization Baseline (1991)	Max A 45 Min D 30	Min A 28 Max D 42	A 35 D 35
Resectorization (1995)	Max A 47 Min D 40	Min A 30 Max D 52	A 43 D 43
Resectorization (2000)	Max A 47 Min D 40	Min A 30 Max D 52	A 43 D 43

TABLE 4. AWP AIRPORTS CAPACITY UNDER IMC (IFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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LOS ANGELES (LAX)

No Resectorization Baseline (1991)	Max A 68 Min D 48	Min A 38 Max D 67	A 55 D 55
Resectorization (1995)	Max A 70 Min D 55	Min A 40 Max D 80	A 65 D 65
Resectorization (2000)	Max A 70 Min D 55	Min A 40 Max D 80	A 65 D 65

LONG BEACH (LGB)

No Resectorization Baseline (1991)	Max A 55 Min D 40	Min A 30 Max D 60	A 45 D 45
Resectorization (1995)	Max A 57 Min D 45	Min A 32 Max D 65	A 52 D 52
Resectorization (2000)	Max A 57 Min D 45	Min A 32 Max D 65	A 52 D 52

OAKLAND (OAK) (NORTH & SOUTH FIELDS)

No Resectorization Baseline (1991)	Max A 40 Min D 20	Min A 15 Max D 45	A 30 D 30
Resectorization (1995)	Max A 40 Min D 20	Min A 15 Max D 45	A 30 D 30
Resectorization (2000)	Max A 40 Min D 20	Min A 15 Max D 45	A 30 D 30

TABLE 4. AWP AIRPORTS CAPACITY UNDER IMC (IFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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ONTARIO (ONT)

No Resectorization Baseline (1991)	Max A 38 Min D 30	Min A 20 Max D 42	A 34 D 34
Resectorization (1995)	Max A 40 Min D 35	Min A 22 Max D 47	A 38 D 38
Resectorization (2000)	Max A 40 Min D 35	Min A 22 Max D 47	A 38 D 38

SAN DIEGO (SAN)

No Resectorization Baseline (1991)	Max A 32 Min D 20	Min A 15 Max D 40	A 28 D 28
Resectorization (1995)	Max A 33 Min D 25	Min A 18 Max D 47	A 31 D 31
Resectorization (2000)	Max A 33 Min D 25	Min A 18 Max D 47	A 31 D 31

SAN FRANCISCO (SFO)

No Resectorization Baseline (1991)	Max A 34 Min D 40	Min A 14 Max D 60	A 37 D 37
Resectorization (1995)	Max A 34 Min D 40	Min A 14 Max D 60	A 37 D 37
Resectorization (2000)	Max A 34 Min D 40	Min A 14 Max D 60	A 37 D 37

TABLE 4. AWP AIRPORTS CAPACITY UNDER IMC (IFR) (Continued)

Wx & Improvements	Arr. Priority	Dept. Priority	50/50
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SAN JOSE (SJC)

No Resectorization Baseline (1991)	Max A 27 Min D 23	Min A 20 Max D 30	A 25 D 25
Resectorization (1995)	Max A 27 Min D 23	Min A 20 Max D 30	A 25 D 25
Resectorization (2000)	Max A 27 Min D 23	Min A 20 Max D 30	A 25 D 25

Orange County (SNA)

No Resectorization Baseline (1991)	Max A 33 Min D 30	Min A 20 Max D 45	A 31 D 31
Resectorization (1995)	Max A 36 Min D 35	Min A 22 Max D 48	A 34 D 34
Resectorization (2000)	Max A 36 Min D 35	Min A 22 Max D 48	A 34 D 34

3.3 RESTRUCTURING AWP AIRSPACE.

Appendix B shows the proposed changes in traffic flow between San Francisco Bay Area and the Los Angeles Basin, as well as the proposed changes to and from the east and northeast of the Los Angeles Basin. The proposed traffic changes between ZOA and ZLA are as follows:

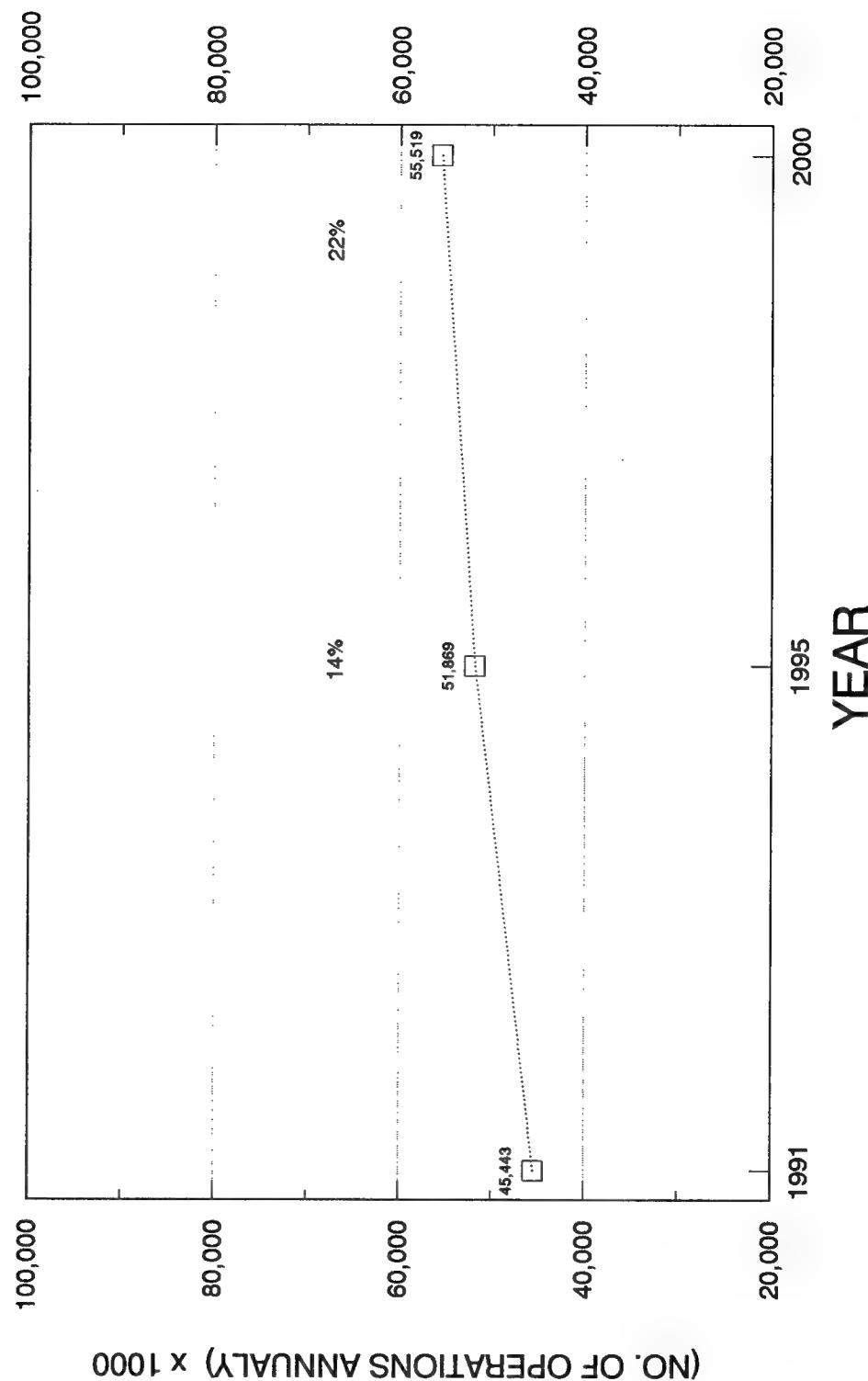
a. Reverse Flow: the traffic flow between the Bay Area in ZOA and the Los Angeles Basin in the ZLA is reversed. The arrivals are southbound along the coastline and the departures are northbound through sector 26.

b. Arrivals (Bay Area to LAX): The primary route from SFO/OAK during the hours 0600-2300 local will be the offshore route, the "Offshore One" or the "Coast One" Standard Instrument Departures (SIDs).

LAX jet arrivals from the north and the ocean will be routed over Ventura (VTU) VORTAC via the SADDE arrivals. The prop arrivals from the north will be routed via San Marcus (RZS) VORTAC to VTU VORTAC, and sequenced by ZLA Area A. Jet arrivals from the east will be routed in two inbound streams at different altitudes to facilitate LAX TRACON's ability to blend them in traffic streams.

FUTURE DEMAND PROJECTIONS SYSTEM WIDE

YEARS : 1995, 2000

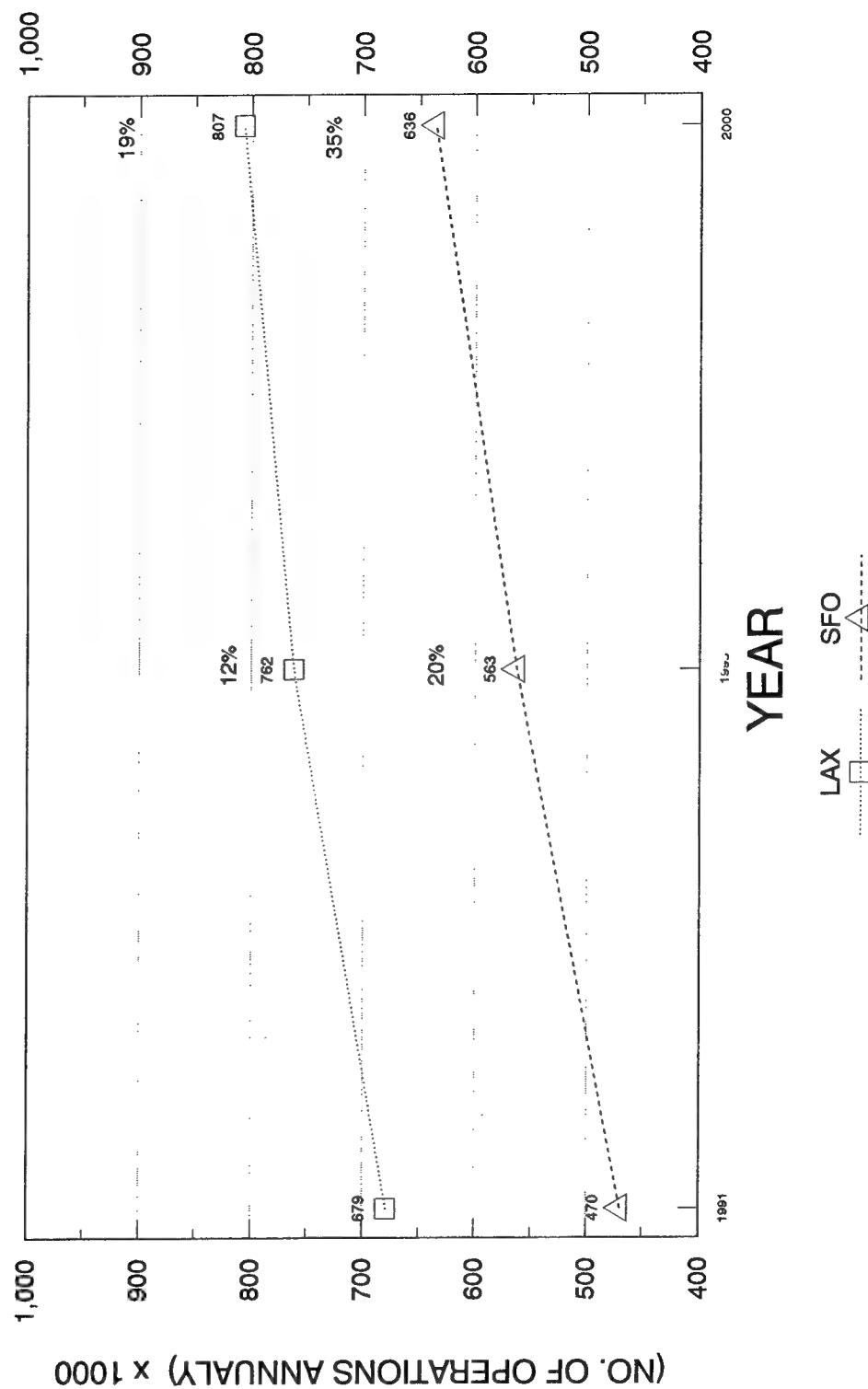


Data provided by FAA-APO-81-5, TAF (FY 1991-2005)

FIGURE 5. FORECASTED NUMBER OF DAILY OPERATIONS SYSTEM-WIDE FOR 1991, 1995, 2000

FUTURE DEMAND PROJECTIONS AT LAX & SFO

YEARS : 1995, 2000



Data provided by FAA-APO-91-5, TAF (FY 1991-2005)

FIGURE 6. FORECASTED NUMBER OF DAILY OPERATIONS AT LAX & SFO FOR 1991, 1995, 2000

LAX jet departures to the northwest will depart with a heading of 250, then be radar vectored by LAX TRACON to a departure gate starting 5 miles northwest of VTU VORTAC and extending 15 miles to the east. Jets landing at SFO will be vectored through the gate and cleared direct of Fellows (FLW) VORTAC, climbing to 16,000 feet (ft). Jets landing at SJC will be vectored through the gate toward REYES intersection, climbing to 16,000 ft. Jets proceeding over Gorman (GMN) VORTAC will be vectored through the gate toward TNP intersection, climbing to 16,000 ft. ZLA Area A will clear aircraft on course. Turboprop to the northwest will depart heading 250, then be radar vectored through the departure gate to either FIM VORTAC or GMN VORTAC 142 radial. Those turboprop proceeding over GMN will be climbing to 8,000 ft and handed off to Burbank TRACON, who will climb the aircraft to 13,000 ft and handoff the aircraft to ZLA Area B.

These routes are parallel, with approximately 12 miles between them. The various crossover and altitude stratifications need to be coordinated with ZOA. The plan is that the crossovers are made while aircraft are in level flight or while in Approach Control Airspace where reduced separation minima can be utilized. An additional advantage to this plan is that each airport is fed in a one-stream flow, as much as it is operationally feasible, which further reduces the need for miles-in-trail and s-turns or speed assignments in the low altitude structures.

4. RESULTS.

(Additional figures are presented in appendix C.)

4.1 AWP AIRPORTS DELAY.

Table 5 shows the total hourly operational delay at AWP airports without the AWP Resectorization Plan for the baseline scenarios for years 1991, 1995, and 2000. The 1991 baseline cases pre-date the AWP Resectorization Plan. For the 1995 and 2000 baseline cases, the new sector design was used to run the simulation since it was implemented in 1992. ZLA-530 provided the Adaptation Controlled Environment System (ACES) data which reflected these changes. The proposed routes were not included, which is the main issue for this study.

These results clearly suggest that AWP airspace should be improved. As future demand increases in 1995 and 2000, the operational delay increases as well. The AWP Resectorization Plan is designed and is expected to increase the capacity at AWP airports to meet the expected growth by the year 2000. The growth is expected to be approximately 14 percent in 1995, and 22 percent in 2000, system-wide, as shown in Figure 5. The growth at LAX and SFO is expected to be 12 and 20 percent in 1995, and 19 and 35 percent in 2000, respectively, as shown in Figure 6.

TABLE 5. BASELINE TOTAL HOURLY OPERATIONAL DELAY AT AWP AIRPORTS FOR 1991, 1995, AND 2000

AIRPORTS	1991 BASELINE	1995 BASELINE	2000 BASELINE
BUR	1,461	2,343	2,517
LAS	3,369	2,997	4,979
LAX	17,361	30,255	67,503
LGB	11,405	46,722	6,992
OAK	1,269	9,421	15,249
ONT	1,011	1,762	3,893
SAN	2,568	5,055	6,734
SFO	11,300	28,774	51,828
SJC	2,430	10,490	21,264
SNA	73,011	125,662	258,236

Figures 7 and 8 present the increase in operational delay over 1991, broken down by ground and airborne delay for the 1995 and 2000 baseline cases respectively. It also shows the percent in which the delay would increase for those years without the Plan.

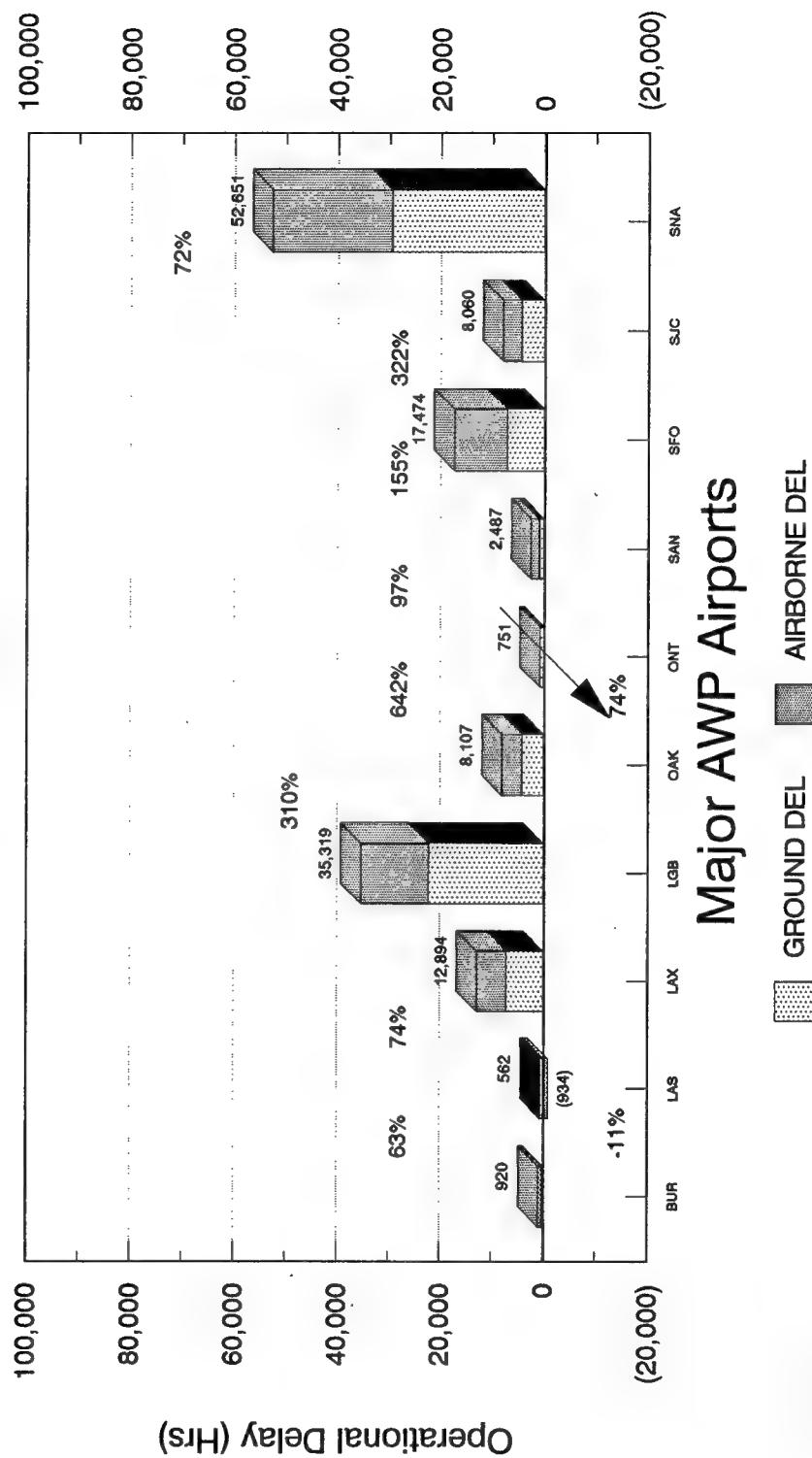
With the AWP Resectorization Plan implemented, the results of the simulation have shown that operational delay at most of the AWP airports would be reduced. Table 6 shows the operational delay at AWP airports with and without the AWP Resectorization Plan for the four future scenarios, where "B" denotes "baseline" or "no resectorization", and "R" denotes "resectorization".

In 1995 cases, the operational delay at LGB and SNA was observed to be much higher than the operational delay at LAX and SFO for both cases, even though LGB and SNA are not considered major airports. On May 6, 1994, the NASPAC team visited the LGB tower to observe the airport operation, and found the reason for the delay. As explained by the tower supervisor, it takes simultaneous coordination by LAX, ZLA and Coast TRACON for an aircraft to depart LGB. It also takes coordination by the entire tower crew for an aircraft to taxi to and from the gate. At SNA, AWP-530 indicated that the delay is realistic because of the limitations of the airport and the high volume of GA traffic. These findings confirmed the simulation results.

Increase In Operational Delay At AWP Airports

Without Resectorization Plan

YEAR : 1995B



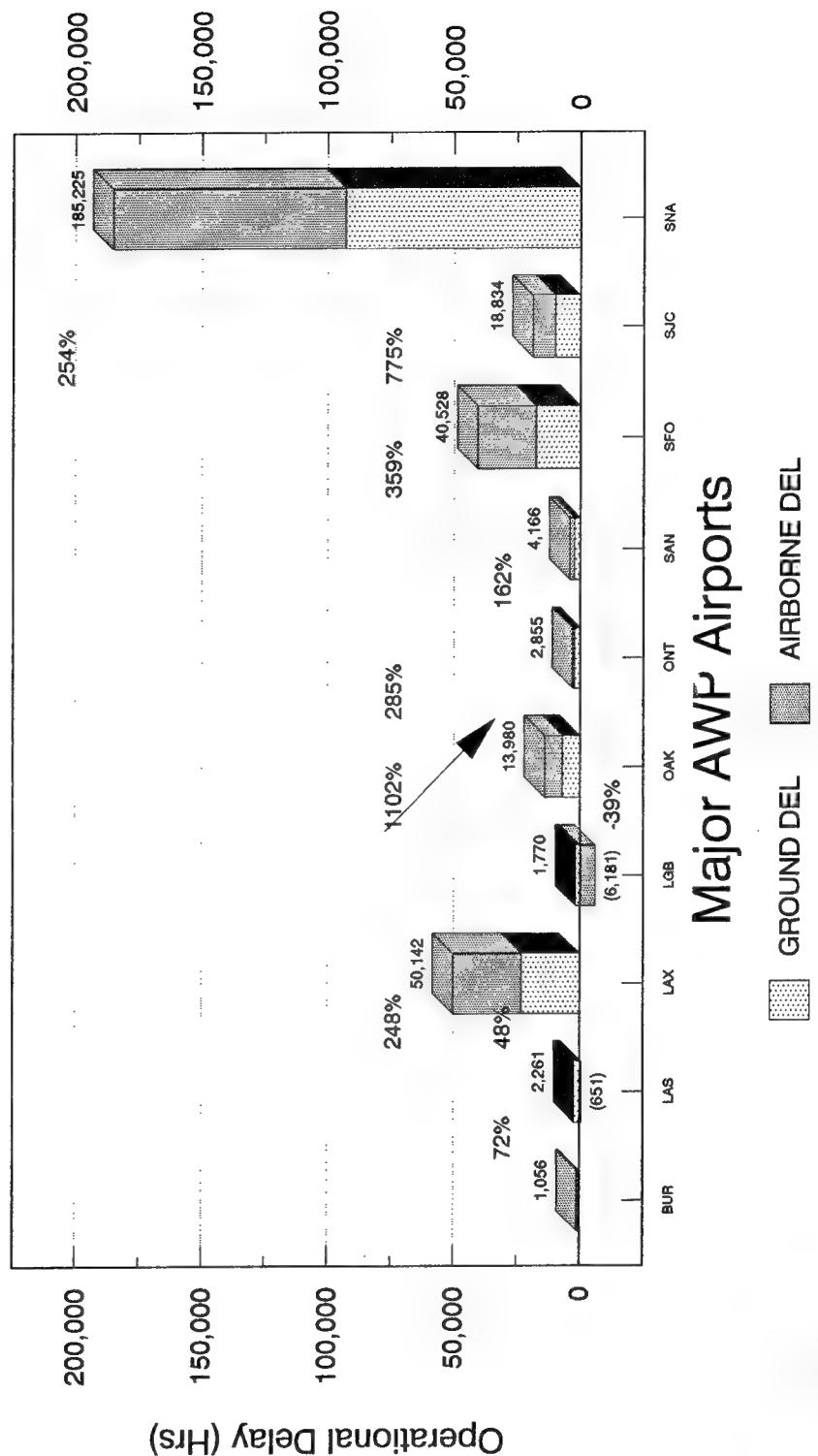
B = Baseline, Del = Delay
 Total Operational Delay = (Ground + Airborne)
 Delta = (1995B - 1981B), Delta/1981B = %

FIGURE 7. EXPECTED GROWTH IN OPERATIONAL DELAY AT AWP AIRPORTS WITHOUT RESECTORIZATION PLAN IN 1995

Increase In Operational Delay At AWP Airports

Without Resectorization Plan

YEAR : 2000B



B = Baseline, Del = Delay
 Total Operational Delay = (Ground + Airborne)
 Delta = (2000B - 1991B), Delta / 1991B = %

FIGURE 8. EXPECTED GROWTH IN OPERATIONAL DELAY AT AWP AIRPORTS WITHOUT RESECTORIZATION PLAN IN 2000

TABLE 6. TOTAL HOURLY OPERATIONAL DELAY FOR 1995 AND 2000
WITH AND WITHOUT RESECTORIZATION

AIRPORTS	1995B	1995R	2000B	2000R
BUR	2,343	2,212	2,517	2,517
LAS	2,997	2,974	4,979	5,055
LAX	30,255	27,461	67,503	49,674
LGB	46,722	45,661	6,992	7,102
OAK	9,421	9,681	15,249	15,782
ONT	1,762	1,781	3,893	3,739
SAN	5,055	4,678	6,734	6,655
SFO	28,774	27,893	51,828	49,197
SJC	10,490	14,182	21,264	20,773
SNA	125,662	125,072	258,236	259,508

For the 2000 baseline cases, the operational delay increases at all AWP airports, except LGB, due to the expected growth in demand. These changes are attributed to improvements in the arrival and departure times in the simulation. At LAX and SFO, delay increases considerably compared to 1995. In the 2000 resectorization cases, LAX gains the most, followed by SFO, with a substantial decrease in delay.

Figure 9 compares 1995B to 1995R, and figure 10 compares 2000B to 2000R. Both show the annual hourly and percent reduction in delay due to the implementation of the AWP Resectorization Plan. In 1995, the negative percentages at OAK, ONT, and SJC indicate that operational delay has increased with resectorization. The delay at SJC has increased by 35 percent due to the changes in the arrival and departure times. OAK delay increased by approximately 3 percent. At ONT, where there are numbers on the top and bottom of the bar, it indicates that the ground delay increased by 30 hours, and the airborne delay decreased by 11 hours in 1995. Therefore, the total operational delay at ONT has increased by one percent.

In 2000, LAX clearly shows the most benefit with a total of 17,829 hours reduction in operational delay or 26.4 percent, followed by SFO with 2,631 hours or 5.1 percent, ONT with 154 hours or 4 percent, and SJC with 491 hours or 2.3 percent. The AWP Resectorization Plan does not benefit OAK in either year, but

**Reduction In Annual Operational Delay
With AWP Resectorization Plan**

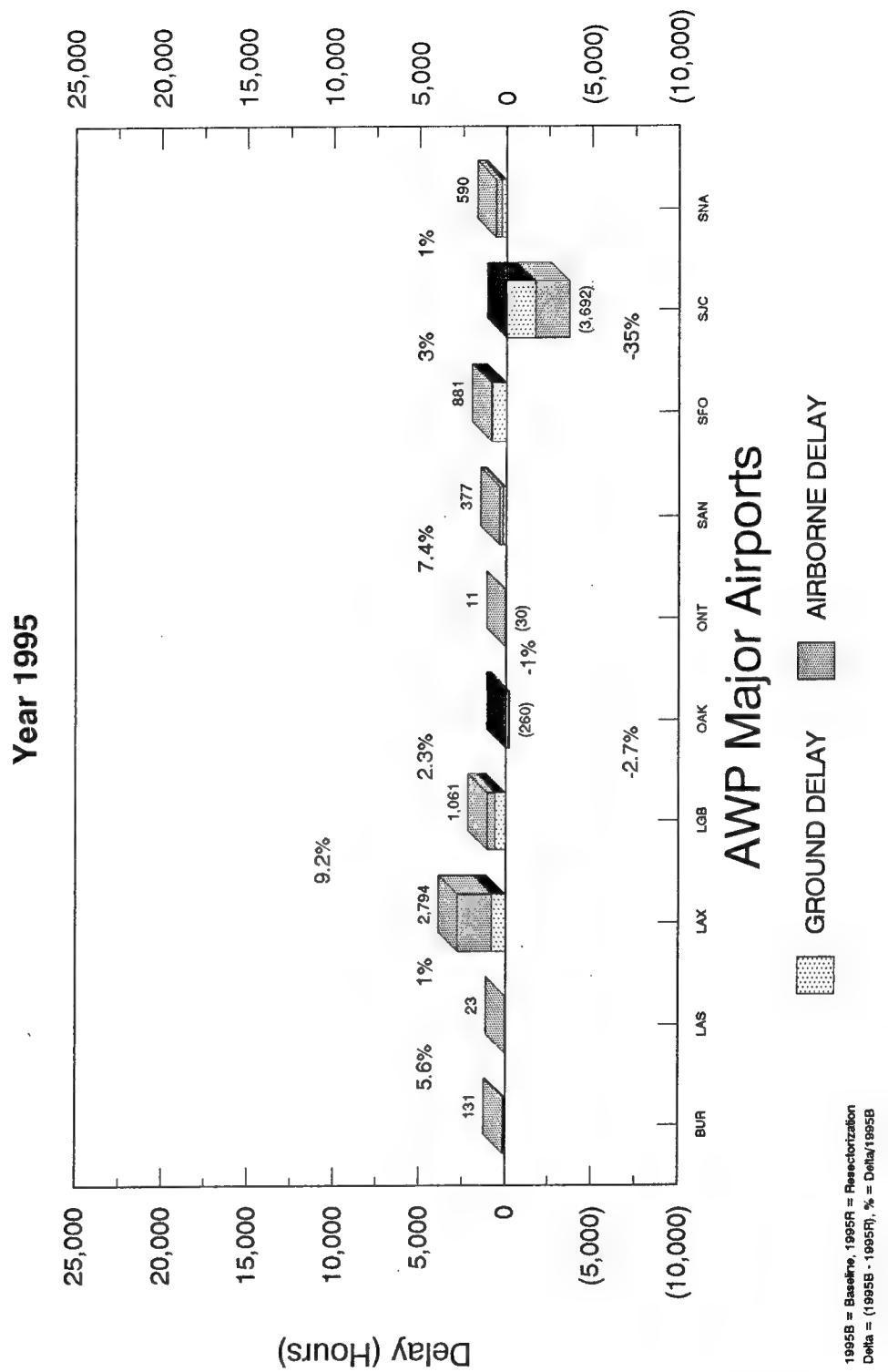
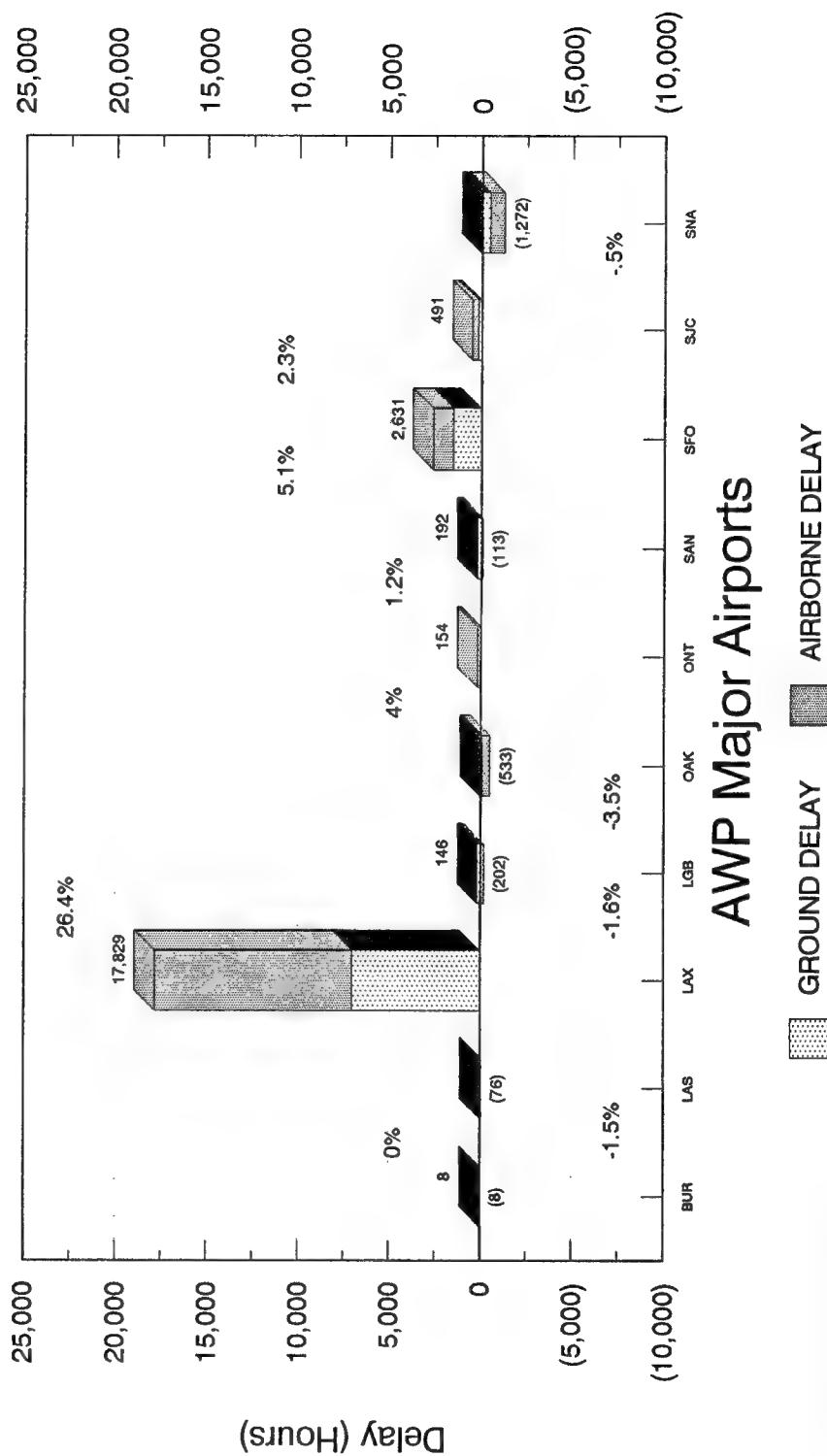


FIGURE 9. REDUCTION IN ANNUAL OPERATIONAL DELAY AT AWP AIRPORTS WITH THE RESECTORIZATION PLAN IN 1995

**Reduction In Annual Operational Delay
With AWP Resectorization Plan**

Year 2000



2000B = Baseline, 2000R = Resectorization
Delta = (2000B - 2000R), % = Delta/2000B

FIGURE 10. REDUCTION IN ANNUAL OPERATIONAL DELAY AT AWP AIRPORTS WITH THE RESECTORIZATION PLAN IN 2000

it does benefit SJC in 2000, where the operational delay shows a decrease of 2.3 percent compared to an increase of 35 percent in 1995. The changes at BUR, LAS, SAN, and SNA are minimal. As far as the operational delay is concerned, the AWP Resectorization Plan provides maximum benefits in year 2000 with the proposed routes in place, including all the slated system improvements.

Table 7 shows the daily average minutes of operational delay at the AWP airports for the time frame modeled. Operational delay has shown slight reductions at LAX, SFO and most of the AWP airports.

TABLE 7. DAILY AVERAGE MINUTES OF OPERATIONAL DELAY
AT AWP AIRPORTS

AIRPORTS	1991B	1995B	1995R	2000B	2000R
BUR	.8	1.2	1.1	1.1	1.2
LAS	1.3	1.0	1.0	1.5	1.6
LAX	3.1	4.8	4.3	10.0	7.4
LGB	2.9	11.0	10.7	1.5	1.5
OAK	.5	2.6	2.6	3.8	4.0
ONT	.9	1.1	1.1	1.8	1.7
SAN	1.3	2.2	2.0	2.6	2.6
SFO	2.8	6.1	6.0	9.8	8.3
SJC	.8	2.7	3.7	4.7	4.6
SNA	16.0	24.0	23.8	46.6	46.8

4.2 AWP AIRPORTS OPERATIONAL DELAY COST.

Section 2.3 briefly summarized how the air carriers cost data are obtained from the Office of Airline Statistics, Data Administration Division, DAI-20. The NASPAC Cost of Delay Module translates delay incurred in the simulation into cost based on operational and passenger delay with 1992 dollars.

The savings at AWP airports are attributed to the reduction in operational delay from added airport capacity due to the AWP Resectorization Plan. Table 8 shows the operational delay cost at AWP airports for the time frame modeled.

TABLE 8. AWP AIRPORTS COST OF OPERATIONAL DELAY (\$1992)

AIRPORT	1995B	1995R	2000B	2000R
---------	-------	-------	-------	-------

BUR	\$3,452,142	\$2,892,770	\$3,509,997	\$3,555,847
LAS	3,328,899	3,377,140	5,064,113	5,138,559
LAX	46,173,976	39,274,153	109,196,849	76,650,417
LGB	57,777,123	56,901,321	9,835,856	10,404,350
OAK	13,146,215	14,063,931	24,505,342	26,030,058
ONT	1,933,136	2,077,946	4,278,606	3,828,736
SAN	7,232,291	6,479,780	9,027,140	9,130,654
SFO	45,587,107	45,118,380	81,833,541	78,649,361
SJC	5,623,761	5,901,344	10,801,745	10,390,205
SNA	27,532,346	28,054,507	59,299,482	59,502,640

Table 9 shows the operational delay savings at AWP airports due to the AWP Resectorization Plan for 1995 and 2000. In some cases, the delay cost has increased due to the Plan, and will be denoted by "--" for these airports. At LAS and SNA, the 1995 simulation results show a reduction in operational delay of one percent, but the actual operational cost increases slightly. This is due to a change in the fleet mix at these two airports. Future demand shows that larger aircraft, such as the B757 which NASPAC uses as a model, are being used and cost more to operate.

In 2000, the results show that the operational delay at BUR remained the same, but the operational delay cost increases by 1.3 percent. SAN shows a reduction in operational delay of 1.2 percent, but an actual delay cost increase of 1.1 percent. LAS, LGB, and OAK show an increase in the delay cost over 1995, but the delay cost at ONT and SNA decreases, due to changes in the fleet mix.

TABLE 9. ANNUAL OPERATIONAL DELAY SAVINGS AT AWP AIRPORTS
WITH AWP RESECTORIZATION PLAN

AIRPORTS	1995	2000
BUR	\$559,372	-\$45,870
LAS	-48,241	- 74,446
LAX	6,899,823	32,546,432
LGB	875,802	-568,494
OAK	-971,716	-1,524,716
ONT	-144,810	449,870
SAN	752,511	-103,514
SFO	468,727	3,234,180
SJC	-277,583	411,540
SNA	-522,161	-203,158

4.3 SYSTEM-WIDE OPERATIONAL DELAY.

Table 10 shows the total hourly operational delay system-wide without the AWP Resectorization Plan, for all the baseline cases modeled (1991, 1995, and 2000). Delay increases over time with or without the Plan, but the increase in delay is smaller with the Plan. System-wide operational delay reduction for any given year is roughly equal to the operational delay reduction at AWP airports. This is not unusual, since the proposed routes are mostly in West Coast airspace.

Without the AWP Resectorization Plan, simulation results have shown that the operational delay in the NAS will increase by an estimated 48 percent in year 1995, and an estimated 128 percent in year 2000.

TABLE 10. TOTAL HOURLY OPERATIONAL DELAY SYSTEM-WIDE

1991 BASELINE	1995 BASELINE	2000 BASELINE
1,102,534	1,637,165	2,519,254

Table 11 shows the total hourly operational delay system-wide, with and without the AWP Resectorization Plan for the years 1995 and 2000, where "D" denotes "delay", "TOT" denotes "total", and "OPER" denotes operational. For 1995 and 2000 baseline cases, the new sector design was used to run the simulation since it was implemented in 1992, but not the proposed routes changes. ZLA-530 provided the ACES data, which reflected these changes. For 1995 and 2000 resectorization cases, the new sector design was used to run the simulation, as well as the proposed routes, which are the main issue for this study.

In 1995, the results clearly show that the AWP Resectorization Plan does not provide the NAS as a whole, the same magnitude of benefits gained by AWP airports, as expected.

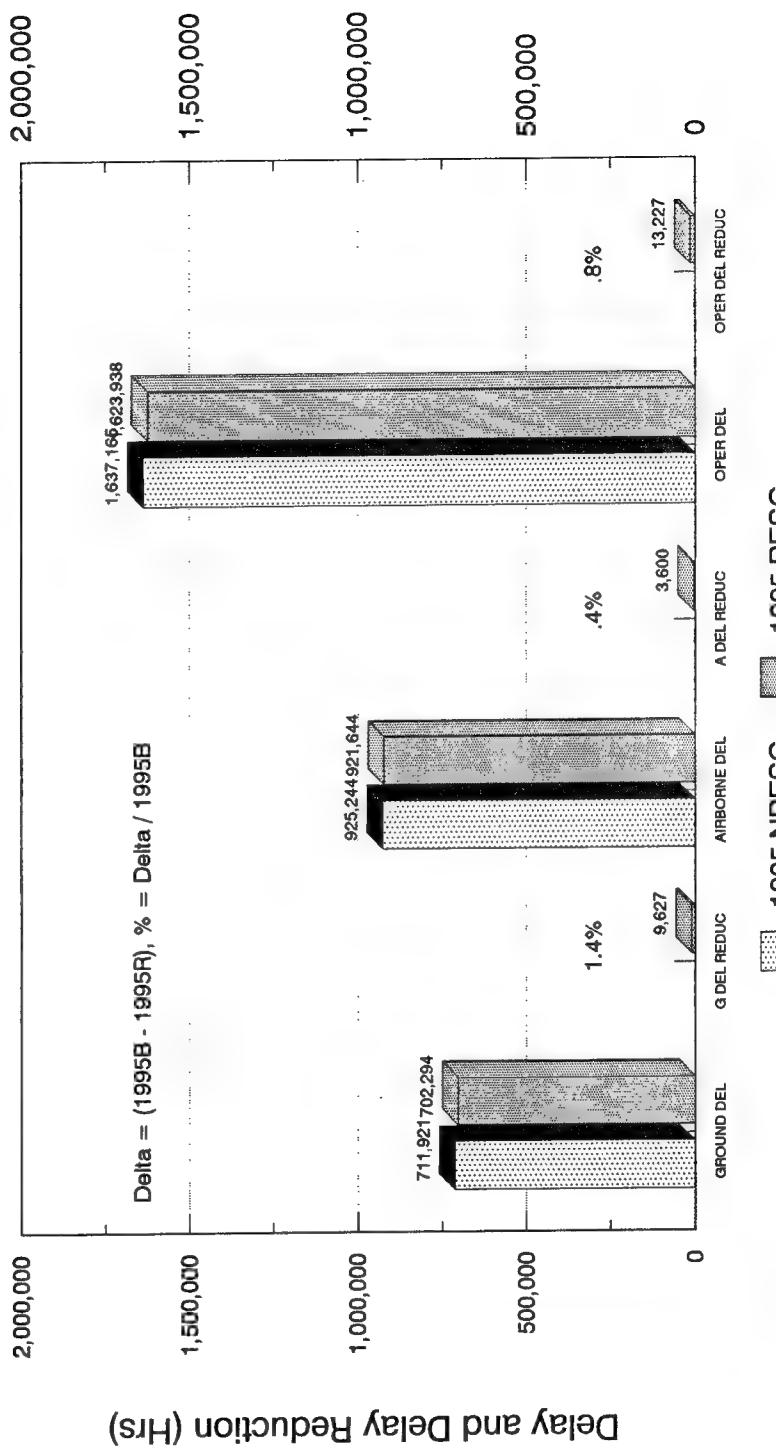
TABLE 11. TOTAL HOURLY OPERATIONAL DELAY SYSTEM-WIDE WITH AND WITHOUT RESECTORIZATION FOR FUTURE YEARS

COMPONENTS	1995B	1995R	2000B	2000R
GROUND D	711,921	702,294	1,122,805	1,099,740
AIRBORNE D	925,244	921,644	1,396,449	1,376,429
TOT OPER D	1,637,165	1,623,938	2,519,254	2,476,168

Figure 11 shows the reduction in operational delay system-wide to be 0.8 percent. Reducing the operational delay to ground and airborne delay shows that the ground delay benefited by 1.4 percent compared to 0.4 percent reduction in the airborne delay. This means that departures had the greatest benefit. This is due to improvements in the departures at AWP airports, and changes in arrival times at airports that are located to the north and northeast of the Los Angeles Basin, where the proposed route changes took place system-wide.

In 2000, the results show some improvement over 1995, as shown in Figure 12. The breakdown in benefits are 1.4 percent in airborne delay and 2 percent in ground delay, with total operational delay reduction of 1.7 percent in 2000 compared to 0.8 percent in 1995. These benefits are also attributed to system-wide improvements slated to be completed by 2000.

**Annual System Wide Operational Delay
With and Without AWP Resectorization
YEAR 1995**



NRESC = No resectorization, Oper = Operational
 RESC = Resectorization, Del = Delay
 Reduc = Reduction, Q = Ground, A = Airborne

FIGURE 11. 1995 SYSTEM-WIDE OPERATIONAL DELAY AND REDUCTION

**Annual System Wide Operational Delay
With and Without AWP Resectorization
YEAR 2000**

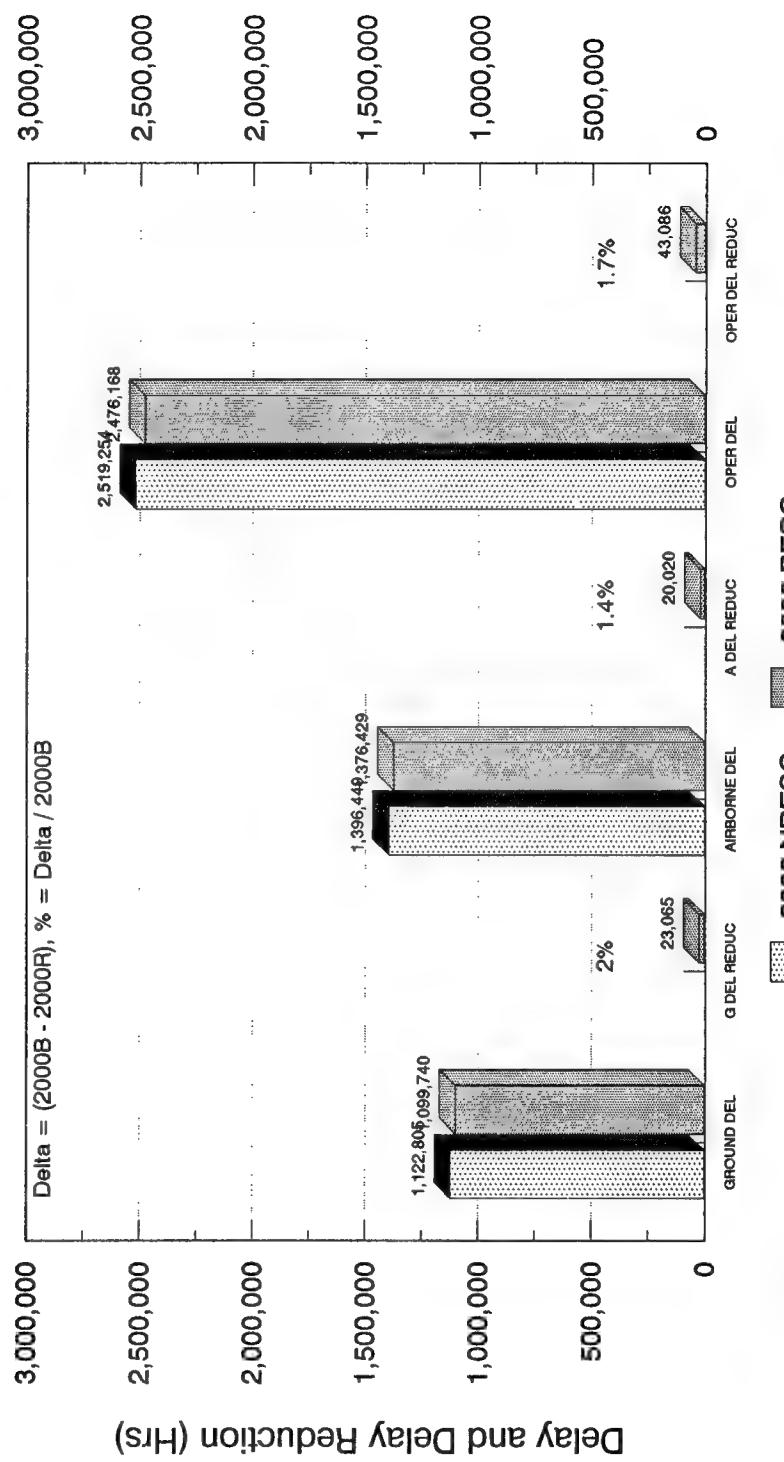


FIGURE 12. 2000 SYSTEM-WIDE OPERATIONAL DELAY AND REDUCTION

4.4 SYSTEM-WIDE OPERATIONAL DELAY COST.

System-wide operational delay costs were estimated for the years 1995B, 1995R, 2000B, and 2000R as shown in table 12.

TABLE 12. SYSTEM-WIDE OPERATIONAL DELAY COST (\$1992)

1995B	1995R	2000B	2000R
\$3,190,810,793	\$3,178,781,195	\$4,973,641,388	\$4,922,600,930

The operational delay savings, system-wide for 1995, due to the AWP Resectorization Plan, is \$12,029,598 (\$1992) or 0.4 percent saving. For 2000, the estimated operational delay savings is \$51,040,455 or one percent reduction in delay cost. Figure 13 shows delay savings and percent of cost reduction for the years 1995 and 2000.

4.5 AWP AIRPORTS PASSENGER DELAY.

As far as the operational delay is concerned, the results have shown that the AWP Resectorization Plan is beneficial locally and system-wide. Exploring the benefits to the passengers looks somewhat different. As expected, the travel times for the proposed routes between San Francisco Bay Area and the Los Angeles Basin are actually longer because the routes are located offshore to avoid cross over traffic, head-ons, and noise. See figures 14 through 17.

Table 13 shows the total annual hourly passenger arrival delay at AWP airports for all future scenarios modeled. These results clearly indicate that the AWP Resectorization Plan does not favor the passengers, and as the demand grows in 1995 and 2000, the passenger delay will increase at a greater rate. This is due to the ripple effect in the system, where the passenger delay propagates throughout the system and only shows at the destination airports.

The simulation results show an increase in the passenger delay across the board for both 1995 and 2000, except at LAS in 2000, where they show a slight reduction. The airports that have the highest traffic volume show the largest passenger delay increase, such as LAX, SFO, and SNA. The AWP Resectorization Plan benefits LGB more in 2000, which is the pattern observed in the operational delay for the same time frame.

**Annual System Wide Operational Delay Cost With &
Without AWP Resectorization & Cost Reduction
YEARS : 1995, 2000**

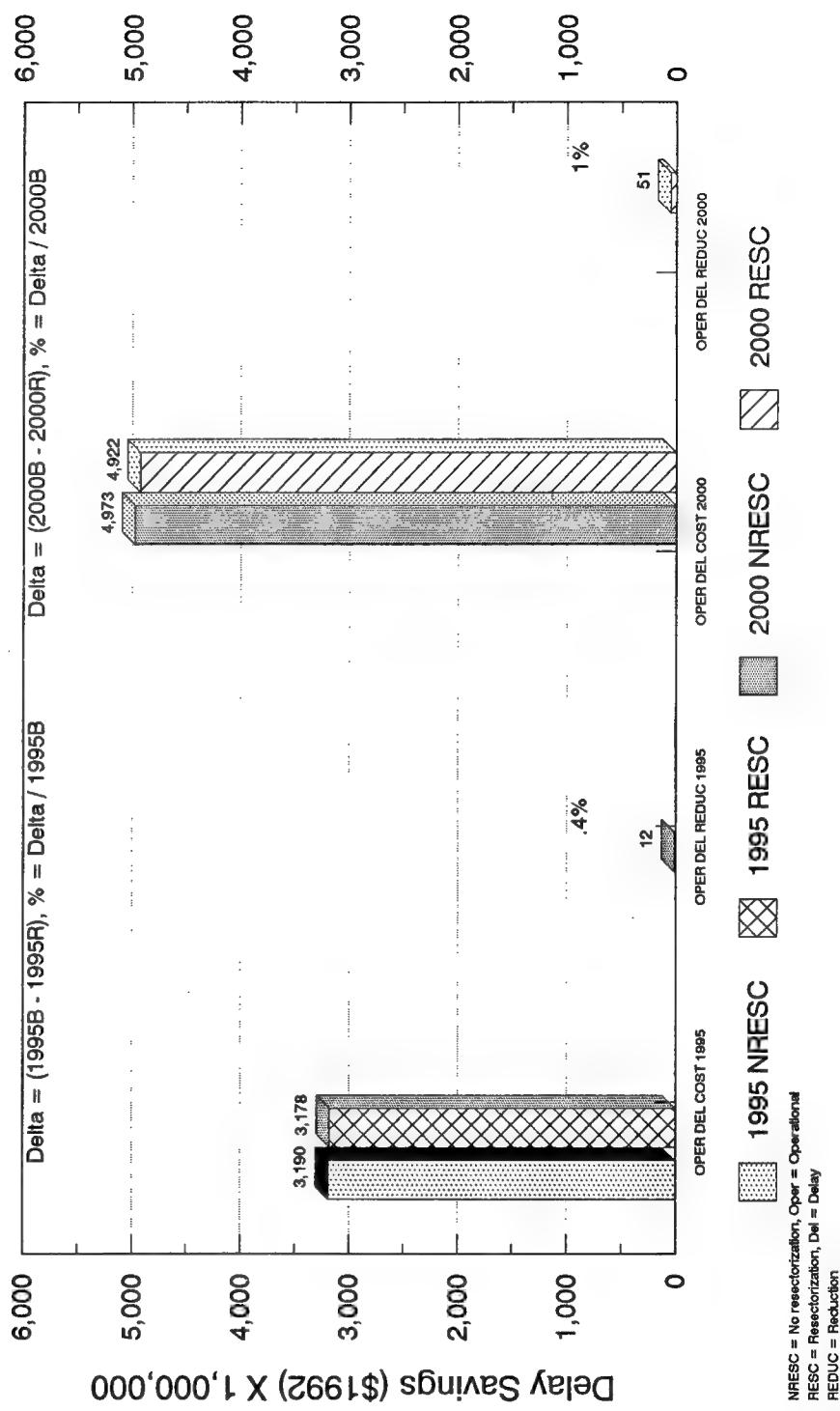


FIGURE 13. ANNUAL SYSTEM-WIDE OPERATIONAL DELAY COST WITH AND WITHOUT RESECTORIZATION AND REDUCTION

Western-Pacific Region Resectorization Plan
Average En route Times Between AWP Airports
May 16, 1995 (100% VMC)

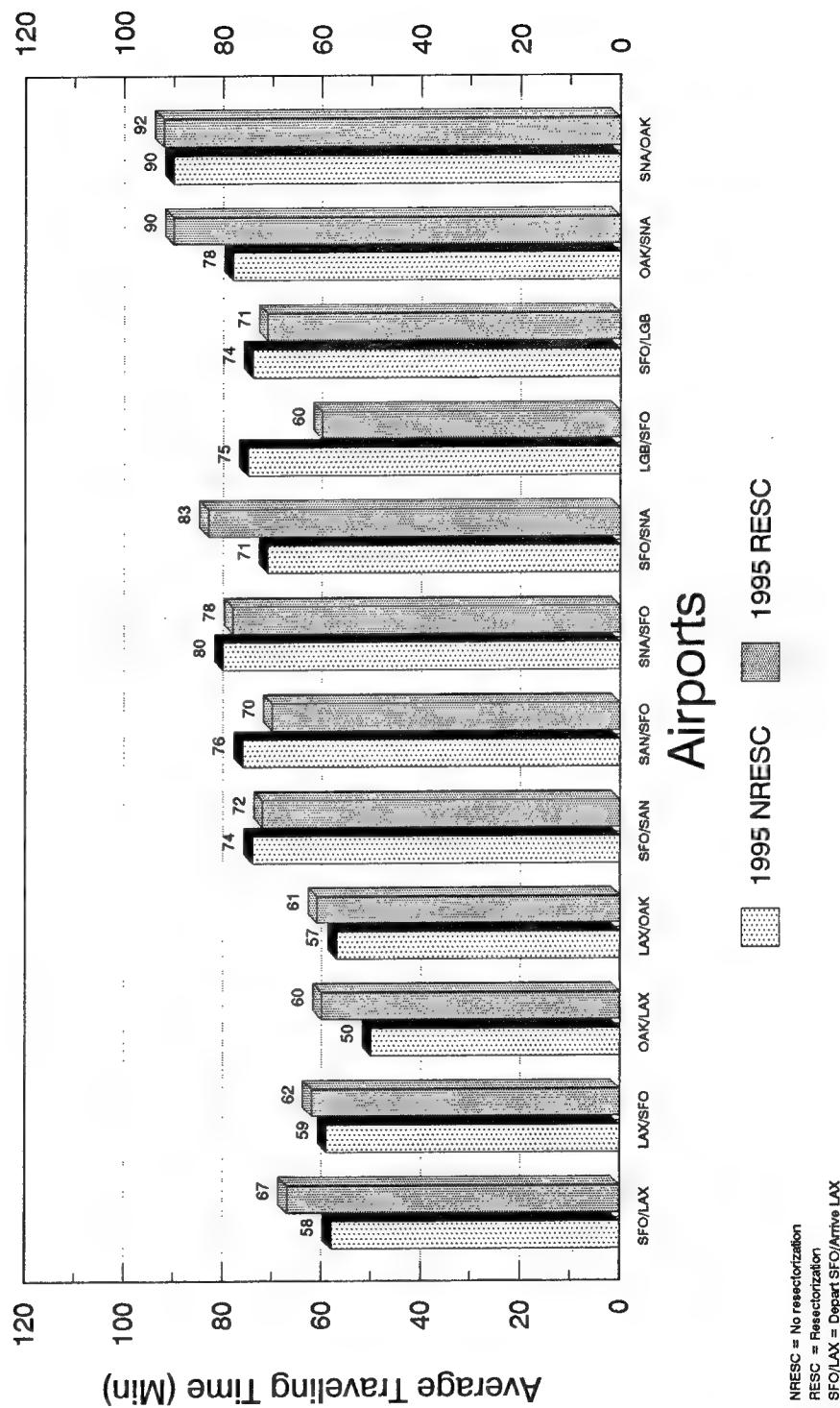
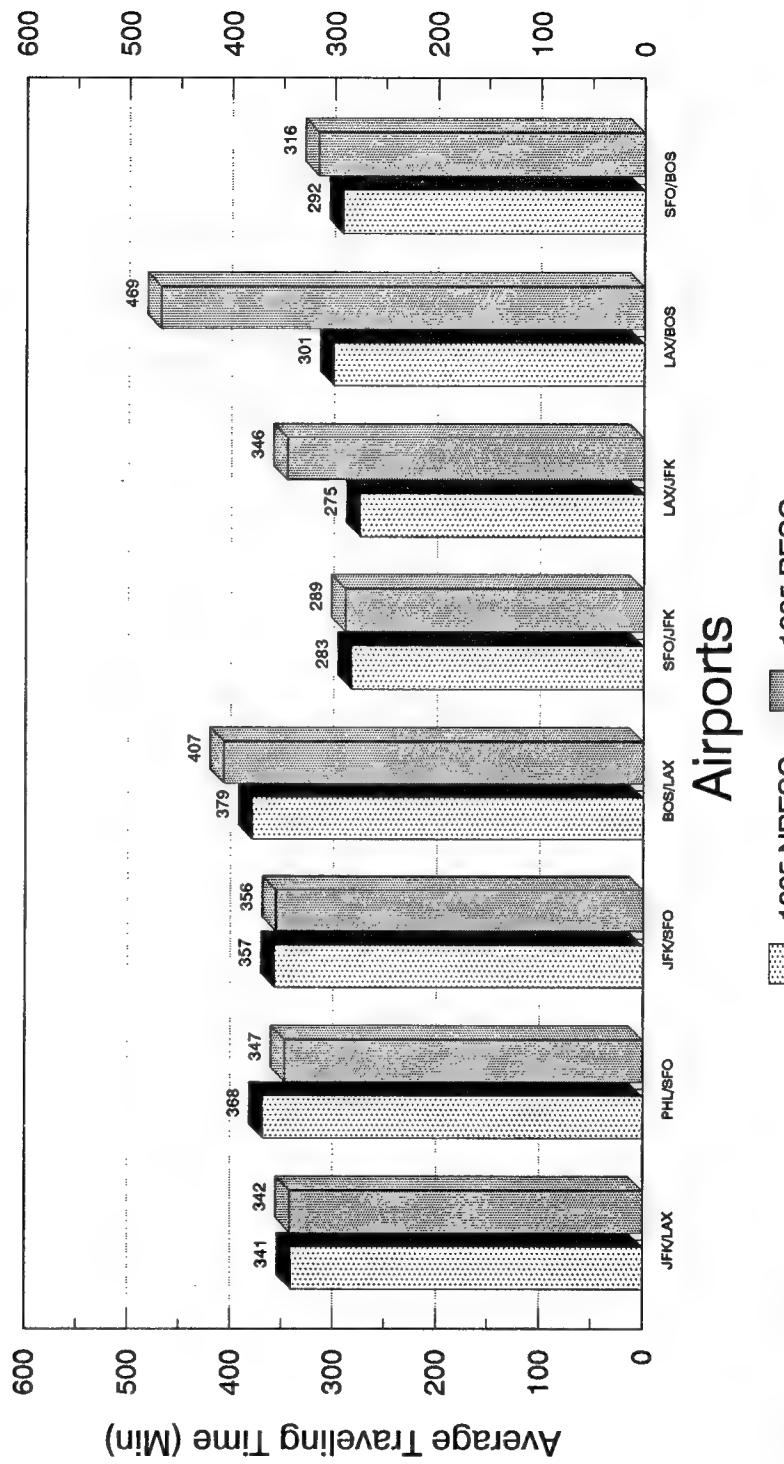


FIGURE 14. AVERAGE EN ROUTE TIMES BETWEEN AWP AIRPORTS FOR 1995

Average En route Times Between
East Coast and West Coast Airports
May 16, 1995 (100% VMC)



NRESC = No resectorization
 RESC = Resectorization
 JFK/LAX = Depart JFK/Arrive LAX

FIGURE 15. AVERAGE EN ROUTE TIMES BETWEEN EAST AND WEST COAST AIRPORTS FOR 1995

Western-Pacific Region Resectorization Plan
Average En route Times Between AWP Airports

May 16, 2000 (100% VMC)

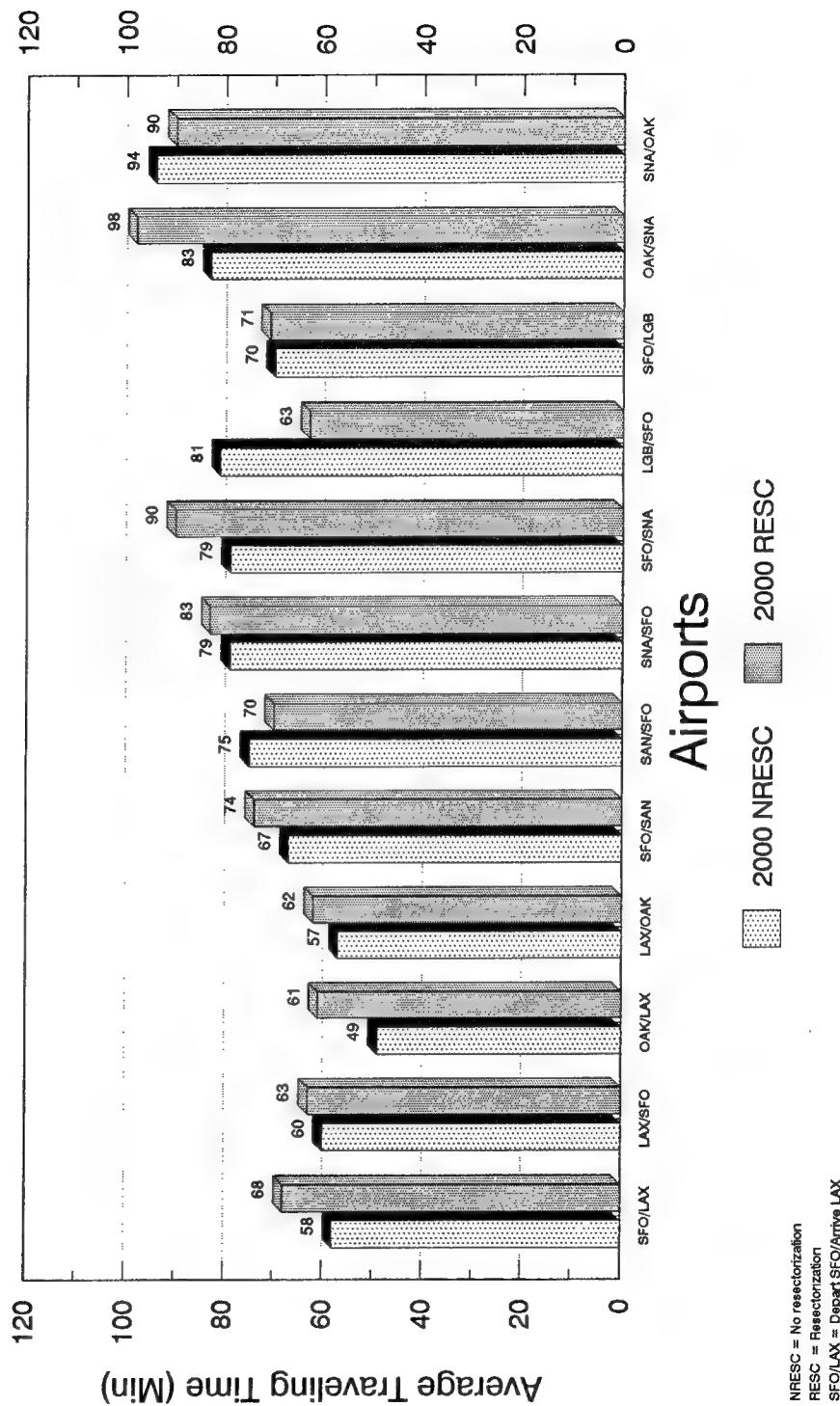


FIGURE 16. AVERAGE EN ROUTE TIMES BETWEEN AWP AIRPORTS FOR 2000

Average En route Times Between
East Coast and West Coast Airports
May 16, 2000 (100% VMC)

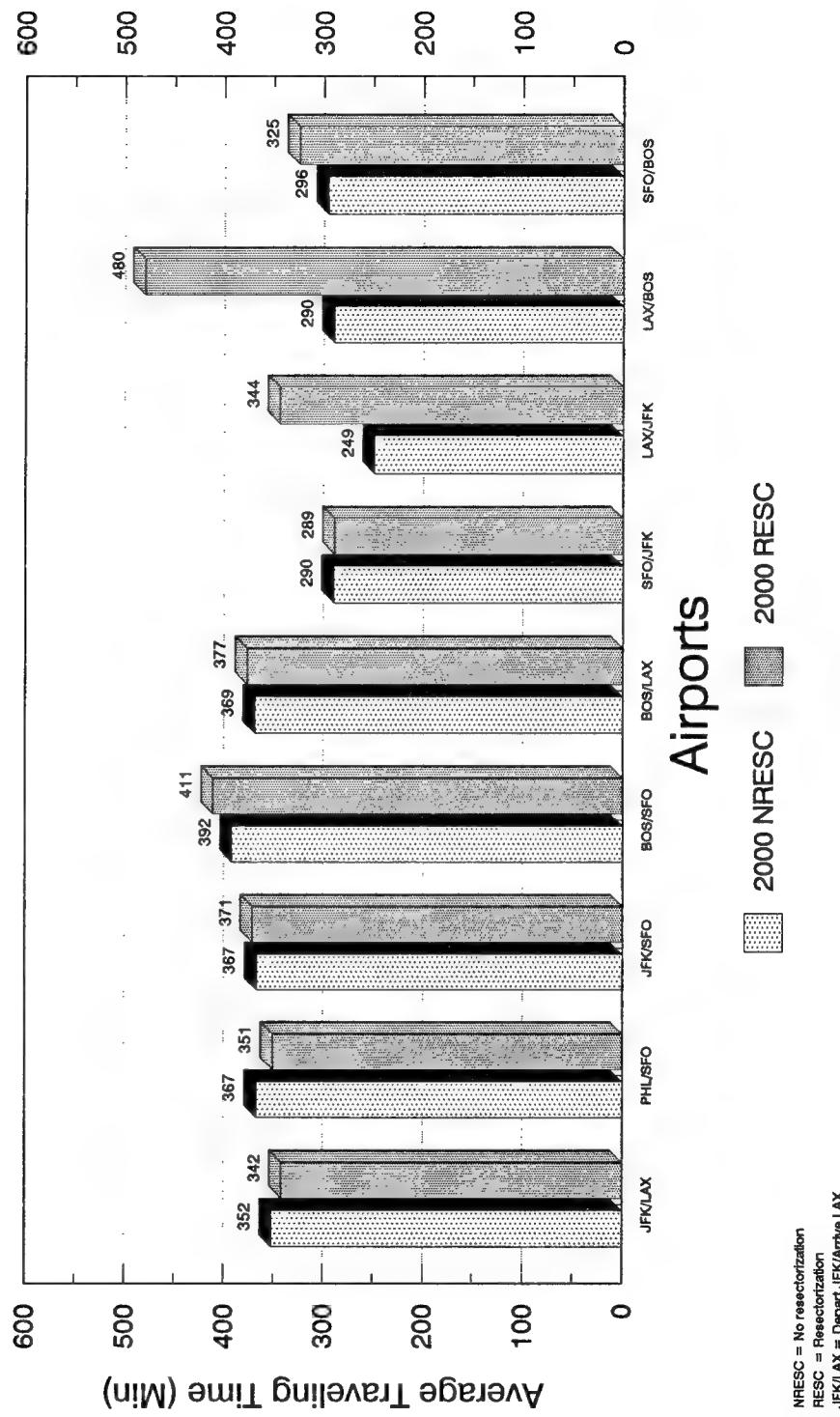


FIGURE 17. AVERAGE EN ROUTE TIMES BETWEEN EAST AND WEST COAST AIRPORTS FOR 2000

TABLE 13. TOTAL HOURLY PASSENGER ARRIVAL DELAY FOR 1995
AND 2000 WITH AND WITHOUT RESECTORIZATION

AIRPORTS	1995B	1995R	2000B	2000R
BUR	11,089	13,113	13,535	16,056
LAS	35,440	36,037	47,413	47,006
LAX	52,332	99,562	93,629	131,733
LGB	43,362	43,685	26,384	27,165
OAK	37,214	39,600	46,945	49,934
ONT	19,895	21,187	31,314	32,820
SAN	18,894	29,543	29,168	39,608
SFO	46,288	51,033	81,955	86,737
SJC	22,303	25,546	35,571	36,667
SNA	100,104	103,107	180,100	184,951

Table 14 shows the increase in passenger arrival delay at AWP airports due to the AWP Resectorization Plan for 1995 and 2000. This is the difference between the baseline and the resectorization cases for each year modeled. It is denoted by "delta" on all the graphs where it is used. The "--" sign means an increase in the passenger arrival delay, and a "+" sign means that the delay has decreased for that particular airport and time frame.

Table 15 shows the daily average minutes of passenger arrival delay at AWP airports for the time frame modeled. Each value represents the daily average passenger arrival delay per aircraft with and without the AWP Resectorization Plan.

In 1995 cases, there was no drastic increase or decrease in the average delay, except at LAX, where the average delay increased by 7.5 minutes, and at SAN with an increase of 4.8 minutes. The only reduction in the average delay due to the Plan was observed at LAS, in 2000, but LGB benefits the most with a reduction of 4.2 minutes compared to 1995.

In 2000, with the Plan scenario, SNA shows the largest increase with 13.7 minutes in the daily average delay compared to 1995. LAX shows an increase of 5.8 minutes, with the rest of the airports showing a large daily average delay increase, especially LAS, OAK, ONT, SAN, and SFO.

TABLE 14. ANNUAL PASSENGER ARRIVAL DELAY INCREASE AT AWP AIRPORTS FOR 1995, 2000

AIRPORTS	1995	2000
BUR	-2,024	-2,521
LAS	-597	+407
LAX	-47,230	-38,104
LGB	-323	-781
OAK	-2,386	-2,989
ONT	-1,292	-1,506
SAN	-10,649	-10,440
SFO	-4,745	-4,782
SJC	-3,243	-1,096
SNA	-3,003	-4,851

TABLE 15. DAILY AVERAGE MINUTES OF PASSENGER ARRIVAL DELAY AT AWP AIRPORTS FOR TIME FRAME MODELED

AIRPORTS	1991B	1995B	1995R	2000B	2000R
BUR	4.2	5.5	6.5	6.4	7.6
LAS	9.1	12.2	12.4	15.0	14.9
LAX	5.8	8.3	15.8	14.0	19.8
LGB	7.0	10.2	10.3	5.9	6.1
OAK	8.6	10.2	10.9	11.9	12.7
ONT	9.9	11.5	12.3	14.2	14.9
SAN	6.2	8.5	13.3	11.5	15.7
SFO	5.5	9.9	10.9	15.5	16.4
SJC	4.3	5.8	6.6	7.9	8.1
SNA	15.4	19.2	19.8	32.6	33.5

The results clearly show that SNA has the highest daily average passenger delay. The delay shows 15.4 minutes in 1991, 19.2 minutes in 1995, and 32.6 minutes in 2000. This is due to a high volume of GA traffic and to the physical limitation of the airport.

Figure 16 compared 1995B to 1995R, and figure 17 compared 2000B to 2000R. Both figures showed the annual hourly increase in passenger arrival delay and the percent increase due to the AWP Resectorization Plan.

The 1995 results show that the airports with the most impact are LAX with 90 percent increase, SAN with 56 percent, BUR with 18 percent, SJC with 15 percent, and SFO with 10 percent. At OAK and ONT, the increase is 6 percent, SNA has 3 percent, and LGB has only one percent. The simulation results show that the airports with the largest operational delay reduction have the largest passenger delay increase. This is reasonable because these airports have the highest traffic volume. Passenger delay reflects the ripple effects of delay at a given airport.

In 2000, the results show that the airports affected the most are LAX with 41 percent, SAN with 36 percent, BUR with 19 percent, and the rest of the airports with 6 percent or less. LAX shows 49 percent improvement over 1995 with the Resectorization Plan, and SAN shows 20 percent, but at BUR, the passenger arrival delay increases by one percent. The results indicate, as shown in figures 18, 19 and 20, that the AWP Resectorization Plan provides the most benefits in 2000. The same pattern was observed in the operational delay at local level and system-wide.

4.6 AWP AIRPORTS PASSENGER ARRIVAL AND SYSTEM-WIDE DELAY COST.

Section 4.2 explained the operational delay cost obtained using the Cost of Delay module. The passenger arrival delay cost was calculated in the same manner. The increase in the passenger arrival delay cost at AWP airports follows the same pattern observed for the passenger arrival delay, and is attributed to ripple effects. The cost of delay and rate at each airport varies, depending on the fleet mix. Table 16 shows the total passenger arrival delay cost at AWP airports with and without the AWP Resectorization Plan for the years 1995 and 2000.

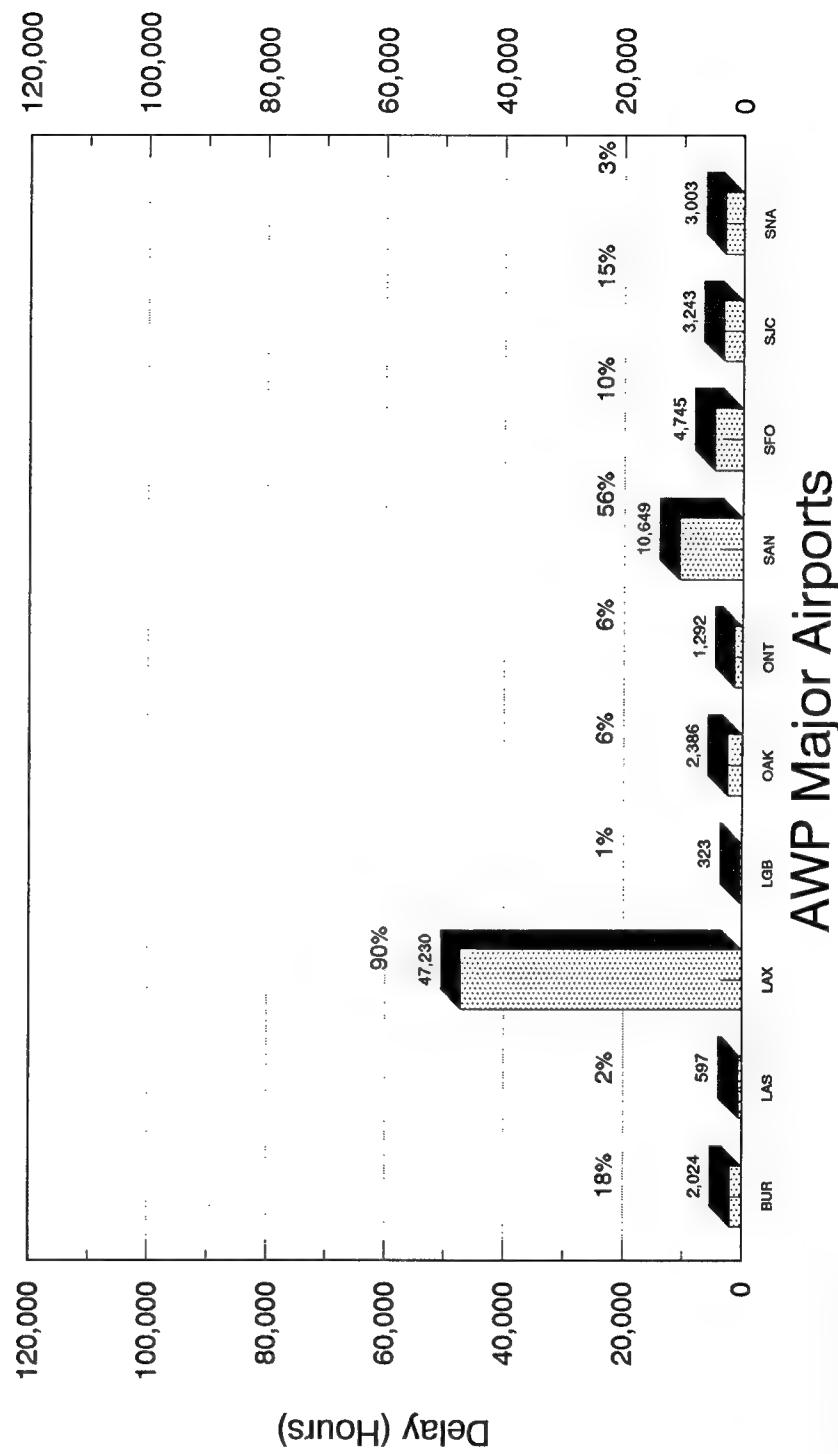
Table 17 shows the passenger arrival delay cost increase at AWP airports due to the AWP Resectorization Plan for 1995 and 2000. The cost increase represents the difference in cost between each of the future years with and without resectorization. The "--" sign denotes an increase in the cost, and "+" sign indicates a decrease in the cost.

System-wide passenger arrival delay costs, estimated for the years 1995B, 1995R, 2000B, and 2000R, are shown in table 18.

Increase In Passenger Delay At AWP Airports

With AWP Resectorization Plan

Year 1995

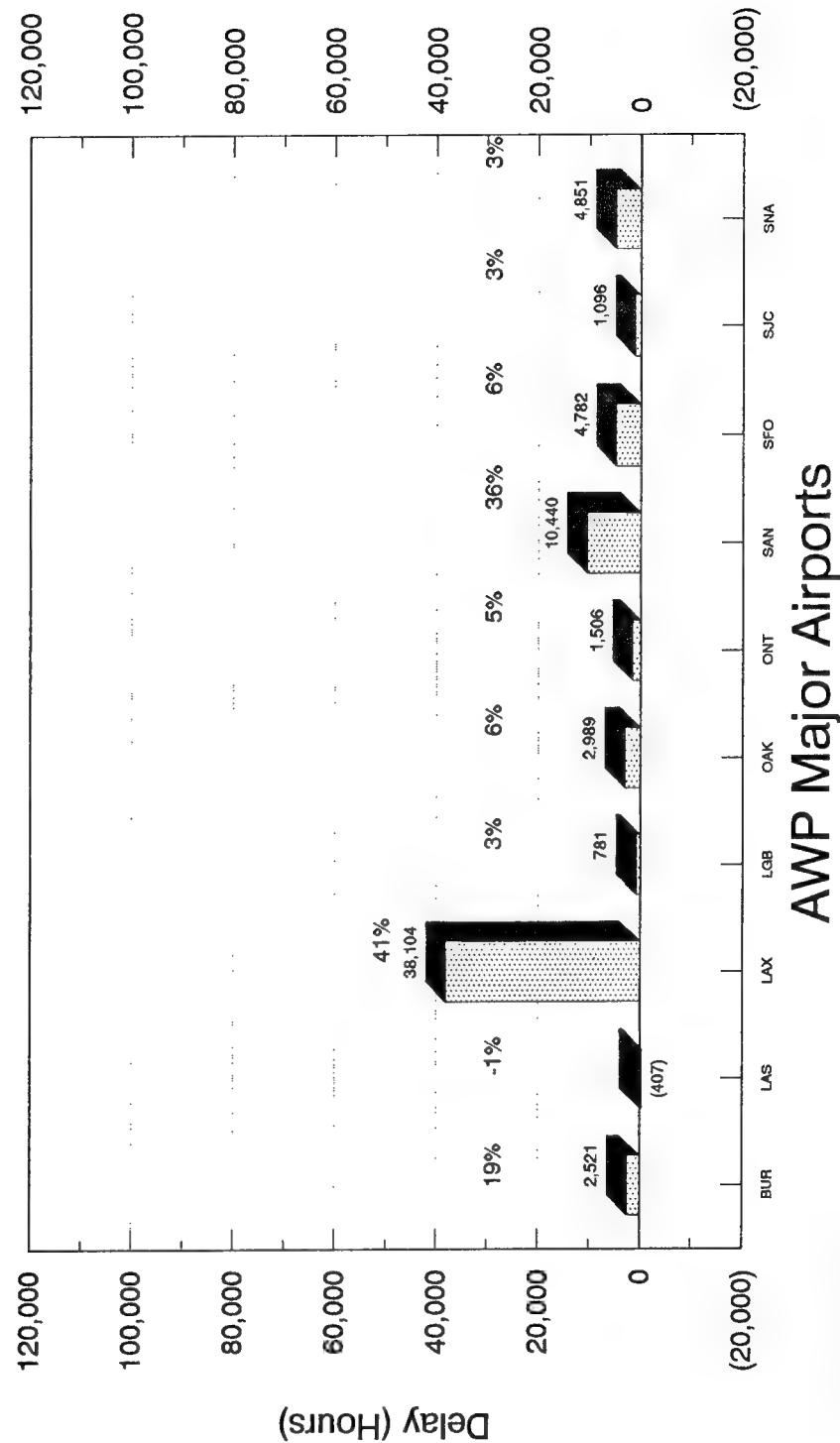


* Delta = (1995B - 1995R), % = Delta/1995B
 B = Baseline, R = Resectorization

FIGURE 18. PASSENGER ARRIVAL DELAY INCREASE WITH RESECTORIZATION AT AWP AIRPORTS FOR 1995

**Increase In Passenger Delay At AWP Airports
With AWP Resectorization Plan**

Year 2000



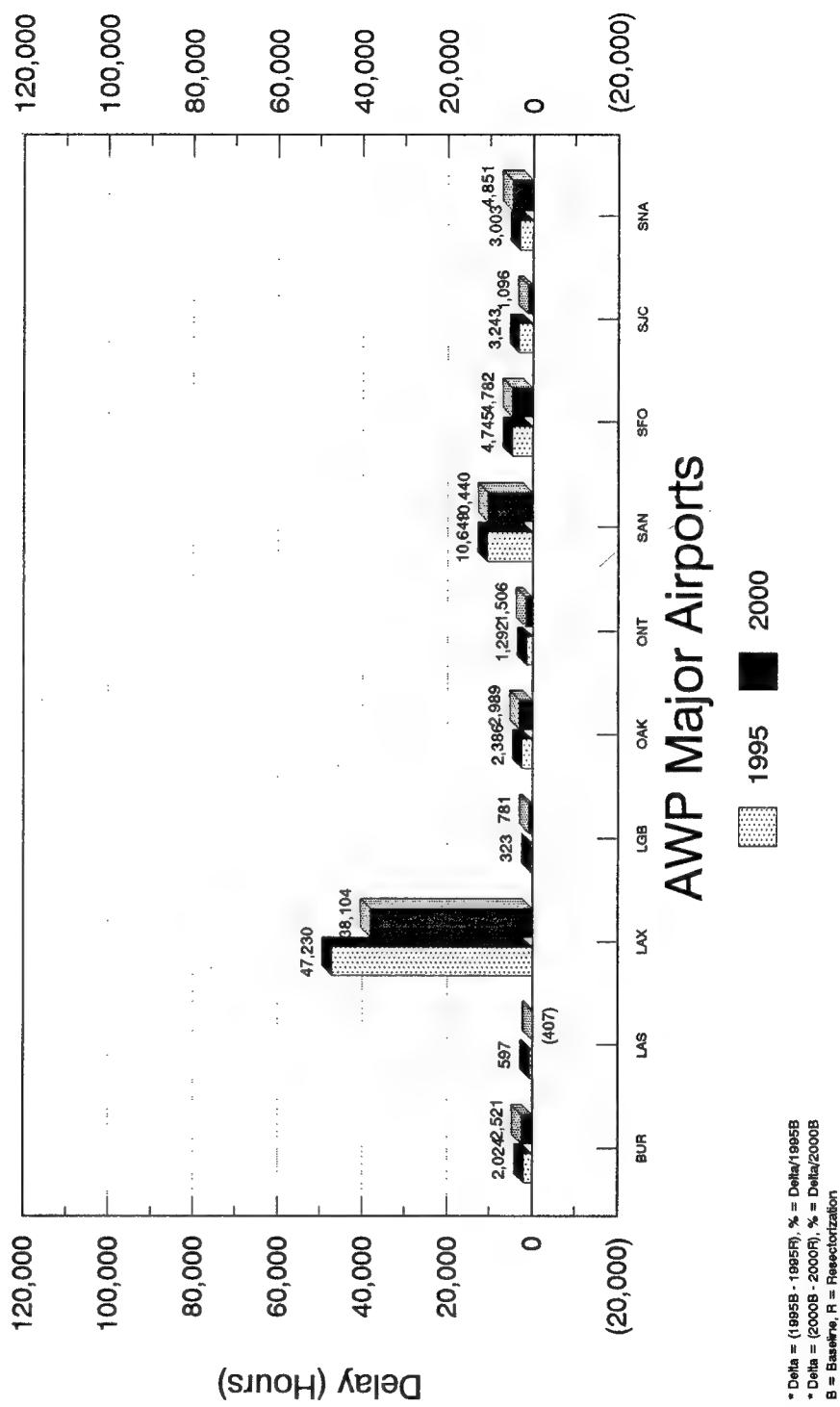
* Delta = (2000B - 2000R), % = Delta/2000B
B = Baseline, R = Resectorization

**FIGURE 19. PASSENGER ARRIVAL DELAY INCREASE WITH RESECTORIZATION
AT AWP AIRPORTS, 2000**

Increase In Passenger Delay At AWP Airports

With AWP Resectorization Plan

Years: 1995, 2000



* Delta = (1995R - 1995B), % = Delta/1995B
 ** Delta = (2000R - 2000B), % = Delta/2000B
 B = Baseline, R = Resectorization

FIGURE 20. INCREASE IN PASSENGER ARRIVAL DELAY
IN 1995 AND 2000

TABLE 16. ANNUAL PASSENGER ARRIVAL DELAY COST
FOR 1995 AND 2000

AIRPORTS	1995B	1995R	2000B	2000R
BUR	\$16,810,163	\$21,142,682	\$20,130,882	\$25,367,206
LAS	85,225,160	83,079,931	116,518,954	114,957,428
LAX	122,395,560	284,623,235	216,709,579	359,241,925
LGB	71,465,521	73,299,953	43,674,674	44,874,405
OAK	76,853,341	81,353,135	97,924,205	104,039,738
ONT	43,945,810	48,490,613	73,929,410	77,694,497
SAN	43,743,503	70,415,263	66,190,450	92,772,360
SFO	94,463,690	105,307,586	173,860,001	185,089,041
SJC	17,838,536	20,687,024	35,953,421	38,577,105
SNA	37,590,065	42,004,134	78,576,110	82,970,468

TABLE 17. ANNUAL PASSENGER ARRIVAL DELAY COST INCREASE AT AWP
AIRPORTS WITH RESECTORIZATION (\$1992)

AIRPORTS	1995	2000
BUR	-\$4,332,519	-5,236,324
LAS	+2,145,229	+1,561,526
LAX	-162,227,675	-142,532,346
LGB	-1,834,432	-1,199,731
OAK	-4,499,794	-6,115,533
ONT	-4,544,803	-3,765,087
SAN	-26,671,760	-26,581,910
SFO	-10,843,896	-11,229,040
SJC	-2,848,488	-2,632,684
SNA	-4,414,609	-4,394,358

TABLE 18. SYSTEM WIDE PASSENGER ARRIVAL DELAY COST FOR 1995
2000 WITH AND WITHOUT RESECTORIZATION (\$1992)

1995B	1995R	2000B	2000R
\$3,851,702,138	\$4,486,247,904	\$6,069,966,153	\$6,575,674,250

The results in this table show that the passenger arrival delay cost will increase by \$634,545,000 or 16 percent in 1995 with the Plan. In 2000, the passenger arrival delay cost estimate shows an increase of \$505,708,000 or 8 percent. These values represent the differences between the baseline and the resectorization cases for the years modeled. This shows that the AWP Resectorization Plan provides the most benefits in 2000.

5. CONCLUSIONS.

It is extremely difficult to increase capacity and reduce delay at an airport without a major construction project to improve the terminal area or build a new runway. The task becomes more difficult trying to improve Western-Pacific Region's (AWP's) 10 major airports simultaneously without drastically increasing delay somewhere else in the system, especially when most of the airports are already at maximum capacity. See appendix A for a list of AWP's 58 airports and IDs. The Los Angeles ARTCC (ZLA) Resectorization Committee, ZLA-3A5, nearly accomplished its objectives with mere hard work, research, coordination, and without any major construction. The results indicate that the increased capacity provided by the AWP Preliminary Resectorization Plan of 1993 (particularly the proposed routes and new sector design) results in a significant reduction in operational delay at most of the major AWP airports. The reduction in delay with resectorization was evident despite the additional demand placed on AWP airports for future years.

A comparison of the percent reduction in annual operational delay at AWP airports with resectorization in place is given in table 19, where the "--" sign denotes an increase.

Table 20 shows the operational delay cost saving estimates at LAX and SFO for a 5-year period (1995-2000), with the AWP Resectorization Plan in place. The work on this study has generated reasonable and conservative estimates of the cost of operational delay under a variety of possible conditions. Linear interpolation was used to estimate the savings for the years that were not modeled.

TABLE 19. PERCENT REDUCTION IN OPERATIONAL DELAY AT AWP AIRPORTS WITH RESECTORIZATION

AIRPORTS	1995	2000
BUR	5.6%	0.0%
LAS	1.0%	-1.5%
LAX	9.2%	26.4%
LGB	2.3%	-1.6%
OAK	-2.7%	-3.5%
ONT	-1.0%	4.0%
SAN	7.4%	1.2%
SFO	3.0%	5.1%
SJC	-35.0%	2.3%
SNA	1.0%	-0.5%

TABLE 20. LAX AND SFO OPERATIONAL DELAY COST SAVINGS FOR A 5-YEAR PERIOD

YEAR	LAX	SFO	TOTAL COST
1995	\$6,899,823	\$468,727	\$7,368,550
1996	12,029,145	1,036,218	13,065,363
1997	17,158,466	1,585,709	18,441,175
1998	22,287,787	2,135,200	24,422,987
1999	27,417,108	2,684,691	30,101,799
2000	32,546,432	3,234,180	35,780,612
TOTALS	118,338,761	11,144,725	129,483,486

Table 21 shows the operational delay savings for a 5-year period (1995-2000) for the entire NAS, which encompasses 58 of the busiest airports in the system. Linear interpolation was used, as well, to estimate the savings for the years that were not modeled.

TABLE 21. SYSTEM-WIDE OPERATIONAL DELAY COST SAVING ESTIMATES FOR 5-YEAR PERIOD WITH RESECTORIZATION

YEAR	OPERATIONAL COST
1995	\$12,029,598
1996	19,831,769
1997	27,633,940
1998	35,436,111
1999	43,238,281
2000	51,040,455
TOTALS	189,210,154

A comparison of the percent increase in annual passenger arrival delay at AWP airports, with resectorization in place, is given in table 22. LAS is the only airport to show passenger arrival delay reduction in year 2000 with one percent, as indicated with a "--" sign.

TABLE 22. PERCENT INCREASE IN ANNUAL PASSENGER ARRIVAL DELAY AT AWP AIRPORTS WITH RESECTORIZATION

AIRPORTS	1995	2000
BUR	18.0%	19.0%
LAS	2.0%	-1.0%
LAX	90.0%	41.0%
LGB	1.0%	3.0%
OAK	6.0%	6.0%
ONT	6.0%	5.0%
SAN	56.0%	36.0%
SFO	10.0%	6.0%
SJC	15.0%	3.0%
SNA	3.0%	3.0%

Table 23 shows the annual passenger arrival delay cost increase estimates at LAX and SFO for 5-year period (1995-2000) with the AWP Resectorization Plan in place. The results indicate that LAX shows a steady reduction in cost for each of the future years, with maximum benefit occurring in 2000. Linear interpolation was used to estimate the savings for the years that were not modeled.

TABLE 23. LAX AND SFO PASSENGER ARRIVAL DELAY COST INCREASE FOR A 5-YEAR PERIOD

YEAR	LAX	SFO	TOTAL COST
1995	\$162,227,675	\$10,843,896	\$173,071,571
1996	158,288,609	10,920,925	169,209,534
1997	154,349,543	10,997,954	165,347,497
1998	150,410,477	11,074,983	161,485,460
1999	146,471,411	11,152,012	157,623,423
2000	142,532,346	11,229,040	153,761,386
TOTALS	914,280,061	66,218,810	980,498,871

Table 24 shows the system-wide annual passenger arrival delay cost increase for a 5-year period (1995-2000). The results clearly show that the AWP Resectorization Plan provides the maximum benefits in 2000 as well, with the benefits increasing for each of the future years. Linear interpolation was used to estimate the savings for the years that were not modeled.

TABLE 24. SYSTEM-WIDE PASSENGER ARRIVAL DELAY COST ESTIMATES INCREASE FOR 5-YEAR PERIOD WITH RESECTORIZATION

YEAR	PASSENGER COST
1995	\$634,545,000
1996	608,778,000
1997	583,011,000
1998	557,244,000
1999	531,477,000
2000	505,710,000
TOTALS	3,420,765,000

6. DISCUSSION.

As far as the operational delay is concerned, the results show that the AWP Resectorization Plan will benefit most of AWP airports for the time frame modeled, with maximum benefits occurring in 2000. LAX shows an impressive 26.4 percent reduction in operational delay with the Plan, as shown in table 19, followed by SFO with 5.1 percent, ONT with 4.0 percent, SJC with 2.3 percent, and SAN with 1.2 percent. The delay reduction at LAX and SFO will translate into monetary savings of \$118,338,761, and \$11,144,725, respectively, for a total of \$129,483,486, for a 5-year period (1995-2000), as shown in table 20.

The AWP Resectorization Plan will provide system-wide benefits with maximum gain occurring in year 2000, with a 1.7 percent reduction in operational delay. The monetary savings for the 5-year (1995-2000) period will be approximately \$189,210,154, as shown in table 21.

The AWP Resectorization Plan does not favor the passengers for the future years modeled, but in the year 2000, the passenger arrival delay decreases by 49 percent at LAX compared to 1995, and by 20 percent at SAN. The monetary increase in passenger arrival delay cost at LAX will be approximately \$914,280,061 for the 5-year (1995-2000) period, and SFO \$66,218,810 for a total of \$980,498,871, as shown in table 23. The system-wide passenger arrival delay will be approximately \$3,420,765,000 as shown in table 24.

7. REFERENCES.

1. Los Angeles ARTC Center (ZLA) Resectorization Committee, Organizational Meeting, ZLA-3A5, June 24, 1990. Advantages to ZLA Resectorization - Operational and Financial, ZLA-3A5, October 5, 1990.
2. Terminal Area Forecasts-Fiscal Years 1991-2005, FAA Aviation Forecast Branch, APO-110, DOT F 1700.7 (8-72), July 1991.
3. Baart, Douglas, Joseph M. Richie, and Kimberly A. May, Cost of Delay Module, DOT/FAA/CT-TN91/52, FAA Technical Center, November 1991.
4. Richie, Joseph M., Douglas Baart, Arthur Pomerantz, A NASPAC-Based Analysis of the Delay and Cost Effects of the Dallas/Fort Worth Metroplex Plan, DOT/FAA/CT-TN92/21, FAA Technical Center, October 1992.
5. Weiss, William E., Estimating Airports Capacities for Use in the NASPAC Simulation Model, MITRE, McLean, VA, June 1993.
6. 1990-91 Aviation System Capacity Plan, FAA/System Capacity and Requirements Office, Washington, DC, September 1990.

Appendix A
Airports Modeled by NASPAC

<u>Airport ID</u>	<u>Airport Name</u>	<u>Airport ID</u>	<u>Airport Name</u>
ABQ	Albuquerque	MCI	Kansas City
ATL	Atlanta	MCO	Orlando
BDL	Bradley	MDW	Chicago Midway
BNA	Nashville	MEM	Memphis
BOS	Boston	MIA	Miami
BUR	Burbank	MKE	Milwaukee
BWI	Baltimore/Washington	MSP	Minneapolis St. Paul
CLE	Cleveland	MSV	New Orleans
CLT	Charlotte	OAK	Oakland
CVG	Cincinnati	ONT	Ontario
DAL	Dallas Love	ORD	Chicago O'Hare
DAY	Dayton	PBI	West Palm Beach
DCA	Washington National	PDX	Portland
DEN	Denver	PHL	Philadelphia
DFW	Dallas/Fort Worth	PHX	Phoenix
DTW	Detroit	PIT	Pittsburgh
EWR	Newark	RDU	Raleigh Durham
FLL	Fort Lauderdale	SAN	San Diego
HOU	Houston	SAT	San Antonio
HPN	White Plains	SDF	Louisville
IAD	Washington Dulles	SEA	Seattle
IAH	Houston	SFO	San Francisco
IND	Indianapolis	SJC	San Jose
ISP	Islip	SLC	Salt Lake City
JFK	New York	SNA	Santa Ana
LAS	Las Vegas	STL	St. Louis
LAX	Los Angeles	SYR	Syracuse
LGA	New York La Guardia	TEB	Teterboro
LGB	Long Beach	TPA	Tampa

Appendix B
AWP Proposed Routes

1 depart arpt = SFO arrival aprt = LAX num_fix =	15
SFO 37.6194 122.3728	
BRINY 37.3048 122.6617	
SEGUL 36.9631 122.5722	
CYPRS 36.4222 122.4322	
TP1 35.5000 121.1333	
MQO 35.2522 120.7583	
GVO 34.5311 120.0900	
GOLET 34.2811 119.8633	
SHELL 34.1531 119.2392	
VTU 34.1000 119.0300	
SADDE 34.0389 118.7636	
BAYST 34.0294 118.6625	
SMO 34.0158 118.4500	
TP2 34.0364 118.2833	
LAX 33.9419 118.4056	
2 depart arpt = SFO arrival aprt = LAX num_fix =	13
SFO 37.6194 122.3728	
PORTE 37.4898 122.4746	
PESCA 37.2682 122.3287	
WAGES 36.9814 121.7325	
TP1 35.6167 120.5500	
RZS 34.5094 119.7700	
SHELL 34.1531 119.2392	
VTU 34.1000 119.0300	
SADDE 34.0389 118.7636	
BAYST 34.0294 118.6625	
SMO 34.0158 118.4500	
TP2 34.0364 118.2833	
LAX 33.9419 118.4056	
1 depart arpt = OAK arrival aprt = LAX num_fix =	14
OAK 37.7197 122.2197	
SEGUL 36.9631 122.5722	
CYPRS 36.4222 122.4322	
TP1 35.5000 121.1333	
MQO 35.2522 120.7583	
GVO 34.5311 120.0900	
GOLET 34.2811 119.8633	
SHELL 34.1531 119.2392	
VTU 34.1000 119.0300	
SADDE 34.0389 118.7636	
BAYST 34.0294 118.6625	
SMO 34.0158 118.4500	
TP2 34.0364 118.2833	
LAX 33.9419 118.4056	
1 depart arpt = SJC arrival aprt = LAX num_fix =	12
SJC 37.3647 121.9292	
MOONY 36.1386 121.5722	
TP1 35.6167 120.5500	

GVO	34.5311	120.0900	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
VTU	34.1000	119.0300	
SADDE	34.0389	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = SFO	arrival aprt = BUR	num_fix =	12
SFO	37.6194	122.3728	
PORTE	37.4898	122.4746	
PESCA	37.2686	122.3287	
TP	37.1100	122.9000	
WAGES	36.9814	121.7325	
TP	35.6167	120.5500	
RZS	34.5094	119.7700	
OHIGH	34.4314	119.3108	
CANYN	34.3911	119.0783	
FIM	34.3500	118.8700	
TOAKS	34.2027	118.7786	
BUR	34.2000	118.3497	
1 depart arpt = OAK	arrival aprt = BUR	num_fix =	12
OAK	37.7197	122.2197	
PORTE	37.4898	122.4746	
PESCA	37.2682	122.3287	
TP	37.1100	122.9000	
WAGES	36.9814	121.7325	
TP	35.6167	120.5500	
RZS	34.5094	119.7700	
OHIGH	34.4314	119.3108	
CANYN	34.3911	119.0783	
FIM	34.3500	118.8700	
TOAKS	34.2027	118.7786	
BUR	34.2000	118.3497	
1 depart arpt = SJC	arrival aprt = BUR	num_fix =	9
SJC	37.3647	121.9292	
MOONY	36.1386	121.5722	
TP	35.6167	120.5500	
RZS	34.5094	119.7700	
OHIGH	34.4314	119.3108	
CANYN	34.3911	119.0783	
FIM	34.3500	118.8700	
TOAKS	34.2027	118.7786	
BUR	34.2000	118.3497	
1 depart arpt = SFO	arrival aprt = SNA	num_fix =	9
SFO	37.6194	122.3728	
BRINY	37.3048	122.6617	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	
TP2	34.2500	120.1667	

SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
SNA	33.6756	117.8667	
1 depart arpt = SFO	arrival aprt = LGB	num_fix =	8
SFO	37.6194	122.3728	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
LGB	33.8200	118.1500	
1 depart arpt = OAK	arrival aprt = SNA	num_fix =	8
OAK	37.7197	122.2197	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
SNA	33.6756	117.8667	
1 depart arpt = OAK	arrival aprt = LGB	num_fix =	8
OAK	37.7197	122.2197	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
LGB	33.8200	118.1500	
1 depart arpt = SJC	arrival aprt = SNA	num_fix =	7
SJC	37.3647	121.9292	
MOONY	36.1386	121.5722	
TP1	35.6167	120.5500	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
SNA	33.6756	117.8667	
1 depart arpt = SJC	arrival aprt = LGB	num_fix =	7
SJC	37.3647	121.9292	
MOONY	36.1386	121.5722	
TP1	35.6167	120.5500	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
SLI	33.7700	118.0497	
LGB	33.8200	118.1500	
1 depart arpt = SFO	arrival aprt = SAN	num_fix =	11
SFO	37.6194	122.3728	
BRINY	37.3048	122.6617	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	

TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
CATLY	33.2208	117.9083	
JOBOW	32.8461	117.9888	
MZB	32.7819	117.2244	
SAN	32.7333	117.1861	
1 depart arpt = OAK arrival aprt = SAN num_fix =			10
OAK	37.7197	122.2197	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP1	35.5000	121.1333	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
CATLY	33.2208	117.9083	
JOBOW	32.8461	117.9888	
MZB	32.7819	117.2244	
SAN	32.7333	117.1861	
1 depart arpt = SJC arrival aprt = SAN num_fix =			9
SJC	37.3647	121.9292	
MOONY	36.1386	121.5722	
TP1	35.6167	120.5500	
TP2	34.2500	120.1667	
SXC	33.3750	118.4189	
CATLY	33.2208	117.9083	
JOBOW	32.8461	117.9888	
MZB	32.7819	117.2244	
SAN	32.7333	117.1861	
1 depart arpt = LAX arrival aprt = SAN num_fix =			6
LAX	33.9419	118.4056	
SXC	33.3750	118.4189	
CATLY	33.2208	117.9083	
JOBOW	32.8461	117.9888	
MZB	32.7819	117.2244	
SAN	32.7333	117.1861	
1 depart arpt = OAK arrival aprt = ONT num_fix =			13
OAK	37.7197	122.2197	
PORTE	37.4897	122.4747	
PESCA	37.2887	122.3286	
TP	37.1100	122.9000	
WAGES	36.9814	121.7325	
AVE	35.6469	119.9775	
EHF	35.4844	119.0961	
PMD	34.6292	118.0833	
TP	34.4242	117.3792	
HITOP	34.2997	117.3417	
PASKO	34.2053	117.3139	
ZIGGY	34.1197	117.2883	
ONT	34.0497	117.5997	
1 depart arpt = SFO arrival aprt = ONT num_fix =			12
SFO	37.6194	122.3728	
PORTE	37.4897	122.4747	
PESCA	37.2887	122.3286	

WAGES	36.9814	121.7325	
AVE	35.6469	119.9775	
EHF	35.4844	119.0961	
PMD	34.6292	118.0833	
TP	34.4242	117.3792	
HITOP	34.2997	117.3417	
PASKO	34.2053	117.3139	
ZIGGY	34.1197	117.2883	
ONT	34.0497	117.5997	
1 depart arpt = LAX	arrival aprt = SFO	num_fix =	10
LAX	33.9419	118.4056	
VTU	34.1000	119.0300	
REYES	34.6586	119.1333	
AVE	35.6469	119.9775	
BSR	36.1811	121.6408	
CARME	36.4550	121.8786	
ANJEE	36.7464	121.9650	
SKUNK	37.0075	122.0331	
MENLO	37.4636	122.1536	
SFO	37.6194	122.3728	
1 depart arpt = BUR	arrival aprt = SFO	num_fix =	9
BUR	34.2000	118.3497	
FIM	34.3500	118.8700	
AVE	35.6469	119.9775	
BSR	36.1811	121.6408	
CARME	36.4550	121.8786	
ANJEE	36.7464	121.9650	
SKUNK	37.0075	122.0331	
MENLO	37.4636	122.1536	
SFO	37.6194	122.3728	
1 depart arpt = LAX	arrival aprt = SJC	num_fix =	8
LAX	33.9419	118.4056	
VTU	34.1000	119.0300	
FIM	34.3500	118.8700	
GMN	34.7997	118.8497	
TP	35.8500	119.9333	
SNS	36.6625	121.6028	
GILRO	37.0311	121.5700	
SJC	37.3647	121.9292	
1 depart arpt = BUR	arrival aprt = SJC	num_fix =	7
BUR	34.2000	118.3497	
FIM	34.3500	118.8700	
GMN	34.7997	118.8497	
TP	35.8500	119.9333	
SNS	36.6625	121.6028	
GILRO	37.0311	121.5700	
SJC	37.3647	121.9292	
1 depart arpt = LAX	arrival aprt = OAK	num_fix =	6
LAX	33.9419	118.4056	
VTU	34.1000	119.0300	
GMN	34.7997	118.8497	
EHF	35.4844	119.0961	

PXN	36.7153	120.7775	
OAK	37.7197	122.2197	
1 depart arpt = BUR	arrival aprt = OAK	num_fix =	5
BUR	34.2000	118.3497	
GMN	34.7997	118.8497	
EHF	35.4844	119.0961	
PXN	36.7153	120.7775	
OAK	37.7197	122.2197	
1 depart arpt = SAC	arrival aprt = LAX	num_fix =	12
SAC	38.5131	121.4917	
FRA	37.1000	119.5797	
AVE	35.6469	119.9775	
FLW	35.0931	119.8644	
RZS	34.5094	119.7700	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
SADDE	34.0389	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = RNO	arrival aprt = LAX	num_fix =	12
RNO	39.4975	119.7667	
FRA	37.1000	119.5797	
AVE	35.6469	119.9775	
FLW	35.0931	119.8644	
RZS	34.5094	119.7700	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
SADDE	34.0389	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = SEA	arrival aprt = LAX	num_fix =	12
SEA	47.4356	122.3083	
LIN	38.0700	121.0000	
AVE	35.6469	119.9775	
FLW	35.0931	119.8644	
RZS	34.5094	119.7700	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
SADDE	34.0389	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = PDX	arrival aprt = LAX	num_fix =	12
PDX	45.5889	122.5917	
LIN	38.0700	121.0000	
AVE	35.6469	119.9775	
FLW	35.0931	119.8644	

RZS	34.5094	119.7700	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
SADDE	34.0389	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = YVR	arrival appt = LAX	num_fix =	12
YVR	49.0775	123.1481	
LIN	38.0700	121.0000	
AVE	35.6469	119.9775	
FLW	35.0931	119.8644	
RZS	34.5094	119.7700	
GOLET	34.2811	119.8633	
SHELL	34.1531	119.2392	
SADDE	34.0399	118.7636	
BAYST	34.0294	118.6625	
SMO	34.0158	118.4500	
TP2	34.0364	118.2833	
LAX	33.9419	118.4056	
1 depart arpt = SFO	arrival appt = MEX	num_fix =	8
SFO	37.6194	122.3728	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP	36.5833	121.1333	
MQO	35.2522	120.7583	
LAX	33.9419	118.4056	
MZB	32.7819	117.2244	
MEX	32.1000	165.0800	
1 depart arpt = OAK	arrival appt = MEX	num_fix =	8
OAK	37.7197	122.2197	
SEGUL	36.9631	122.5722	
CYPRS	36.4222	122.4322	
TP	35.5000	121.1333	
MQO	35.2522	120.7583	
LAX	33.9419	118.4056	
MZB	32.7819	117.2244	
MEX	32.1000	165.0800	
1 depart arpt = ABQ	arrival appt = LAX	num_fix =	10
ABQ	35.0417	106.6056	
ZUN	34.9658	109.1545	
PYRIT	34.8696	110.5114	
DRK	34.7025	112.4794	
PKE	34.1000	114.6700	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = ATL	arrival appt = LAX	num_fix =	19
ATL	33.6392	84.4250	

WETWO	33.7286	85.1239
VUZ	33.6700	86.8797
ZTL	33.5927	87.6006
IGB	33.4855	88.5136
GRW	33.4638	90.2773
SUTTN	33.5059	92.3746
ZME	33.5079	92.5646
WOOTN	33.5109	92.9158
SPS	33.9797	98.5797
TURKI	34.2933	100.9947
ZFW	34.4609	102.5070
TXO	34.4950	102.8392
SJN	34.4241	109.1435
CHEAR	34.3699	110.4712
PAYSO	34.3658	110.7942
TNP	34.1294	115.9389
CIVET	34.0350	117.3889
LAX	33.9419	118.4056
1 depart	arpt = BOS	arrival apt = LAX num_fix = 15
BOS	42.3500	70.9800
CAM	42.9797	73.3297
SYR	43.1497	76.2000
DEN	39.8003	104.8867
LAWSN	39.5178	106.4763
DBL	39.4393	106.8947
ZDV	38.6211	109.9833
HVE	38.4168	110.6997
BCE	37.6892	112.3039
ZLC	37.5009	112.5984
BLD	35.9958	114.8636
HEC	34.7970	116.4629
RESOR	34.3901	116.9613
CIVET	34.0350	117.3889
LAX	33.9419	118.4056
1 depart	arpt = BNA	arrival apt = LAX num_fix = 21
BNA	36.1197	86.6700
MEM	35.0497	89.9697
LIT	34.6775	92.1803
ZME	35.0628	94.9977
KLUBB	35.1202	95.4669
DWINE	35.2027	96.1691
IRW	35.3586	97.6092
SERTS	35.3543	98.8699
ZFW	35.3333	100.0000
AMA	35.2875	101.6393
TCC	35.1821	103.5985
ABQ	35.0438	106.8163
ZUN	34.9658	109.1545
PYRIT	34.8696	110.5114
DRK	34.7025	112.4794
PKE	34.1000	114.6700
TNP	34.1294	115.9389

PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = BWI	arrival aprt = LAX	num_fix = 19
BWI	39.1750	76.6694	
BAL	39.1700	76.6500	
GORDO	39.8757	88.4965	
ZID	39.8684	88.1482	
VHP	39.8147	88.1482	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
PWE	40.2000	96.2000	
ZMP	39.8246	98.9785	
GLD	39.3800	101.6800	
HGO	38.8150	103.6261	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = CMH	arrival aprt = LAX	num_fix = 18
CMH	39.9797	82.8797	
VHP	39.7997	86.3700	
ZID	39.8684	88.1482	
GORDO	39.8757	88.4965	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
PWE	40.2000	96.2000	
ZMP	39.8246	98.9785	
GLD	39.3800	101.6800	
HGO	38.8150	103.6261	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = CVG	arrival aprt = LAX	num_fix = 26
CVG	39.0489	84.6639	
JUDDI	38.7594	86.4402	
ZID	38.8133	87.9382	
CAROL	38.8392	88.9712	
JIGSY	38.8422	89.1198	
STL	38.8607	90.4824	
TRAKE	38.6919	91.7428	
ELSTO	38.6362	92.1309	

SCAWT	38.3553	93.9779	
BUM	38.2700	94.4800	
FRACA	38.1823	96.7591	
PEABO	38.1503	97.3752	
GCK	37.9191	100.7251	
ZKC	37.7966	102.0114	
ALS	37.3491	105.8156	
FMN	36.7483	108.0981	
COCAN	36.3125	110.3520	
TBC	36.1213	111.2696	
ZDV	36.0291	111.7096	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = DAY arrival aprt = LAX num_fix =			18
DAY	39.9017	84.2194	
VHP	39.7997	86.3700	
ZID	39.8684	88.1482	
GORDO	39.8757	88.4965	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
PWE	40.2000	96.2000	
ZMP	39.8246	98.9785	
GLD	39.3800	101.6800	
HGO	38.8150	103.6261	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = DEN arrival aprt = LAX num_fix =			13
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4763	
DBL	39.4393	106.8947	
ZDV	38.6211	109.9833	
HVE	38.4168	110.6997	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
GFS	35.1311	115.1756	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = DFW arrival aprt = LAX num_fix =			17

DFW	32.8964	97.0333	
WORTH	32.8392	99.5994	
ABI	32.4697	99.8497	
INK	31.8748	103.2436	
ZFW	31.8884	103.6228	
CONNE	31.9342	105.3295	
EWM	31.9497	106.2697	
SSO	32.2692	109.2631	
BXK	33.4534	112.8246	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1122	115.7699	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arprt = DTW	arrival aprt = LAX	<u>num_fix</u> = 22
DTW	42.2186	83.3472	
DUNKS	42.4272	84.1942	
ALPHE	42.4356	84.4966	
ZOB	42.4473	85.0000	
PMM	42.4655	86.1059	
BAE	43.1197	88.2800	
DBQ	42.4028	90.7083	
ZAU	42.5538	93.0977	
FOD	42.6112	94.2948	
ONL	42.4703	98.6864	
ZMP	42.3581	99.3123	
CYS	41.2000	104.7697	
EKR	40.0700	107.9200	
ZDV	39.2636	110.0237	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
GFS	35.1311	115.1756	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arprt = ELP	arrival aprt = LAX	<u>num_fix</u> = 12
ELP	31.8072	106.3861	
EWM	31.9497	106.2697	
SSO	32.2692	109.2631	
BXK	33.4534	112.8246	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1122	115.7699	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	

LAX	33.9419	118.4056	
1 depart arpt = EWR	arrival arpt = LAX	<u>num_fix</u> =	36
EWR	40.6944	74.1667	
RBV	40.2000	74.4800	
SUZIE	40.4533	75.9727	
RAV	40.5534	76.5994	
VALLO	40.6268	77.4384	
BURNI	40.6568	77.8039	
ZNY	40.6706	77.9761	
EWC	40.8252	80.2116	
MAINE	40.8934	81.6880	
MORES	40.8984	81.8179	
GONER	40.9657	84.2008	
ZOB	40.9735	84.7008	
FWA	40.9697	85.1800	
WHETT	41.1602	86.5841	
BDF	41.1597	89.5879	
YOU DO	41.0544	90.5221	
BURKK	40.9691	91.2308	
ALBRT	40.8414	92.2283	
JAVAS	40.7656	92.7888	
ZAU	40.6631	93.5148	
LMN	40.5967	93.9676	
PWE	40.2004	96.2063	
ZMP	39.5962	98.8644	
HLC	39.2588	100.2259	
PUB	38.2943	104.4294	
FMN	36.7484	108.0989	
COCAN	36.3125	110.3520	
TBC	36.1213	111.2696	
ZDV	36.0291	111.7096	
PGS	35.6197	113.5300	
EED	34.7500	114.4697	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = IAH	arrival arpt = LAX	<u>num_fix</u> =	14
IAH	29.9497	95.3297	
FST	30.9167	102.9167	
FIGMO	31.5908	105.3819	
ELP	31.8072	106.3861	
SSO	32.2692	109.2622	
BXK	33.4534	112.8246	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	

LAX	33.9419	118.4056	
1 depart	arpt = IAD	arrival appt = LAX	<u>num_fix</u> = 12
IAD	38.9436	77.4528	
IHD	39.9742	79.3586	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
GLD	39.3800	101.6800	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = IND	arrival appt = LAX	<u>num_fix</u> = 15
IND	39.7197	86.2697	
ROCKY	39.5879	88.8336	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
PWE	40.2000	96.2000	
ZMP	39.8246	98.9785	
GLD	39.3800	101.6800	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = JFK	arrival appt = LAX	<u>num_fix</u> = 13
JFK	40.6197	73.7697	
RAV	40.5497	76.5797	
PUB	38.2943	104.4294	
FMN	36.7484	108.0989	
COCAN	36.3125	110.3520	
TBC	36.1213	111.2696	
ZDV	36.0291	111.7096	
PGS	35.6197	113.5300	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = MCI	arrival appt = LAX	<u>num_fix</u> = 18
MCI	39.2992	94.7167	
STJ	39.7711	94.9083	
PWE	40.2000	96.2000	
ZMP	39.8246	98.9785	
GLD	39.3800	101.6800	
HGO	38.8150	103.6256	
PUB	38.2800	104.4200	

FMN	36.7484	108.0989	
COCAN	36.3125	110.3520	
TBC	36.1213	111.2696	
ZDV	36.0291	111.7096	
PGS	35.6197	113.5300	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = MDW	arrival aprt = LAX	num_fix = 15
MDW	41.7858	87.7500	
OBH	41.3756	98.3531	
ZMP	41.3467	99.0304	
SNY	41.0967	102.9830	
VIKNN	40.9670	103.6758	
EKR	40.0675	107.9249	
CISCO	39.3033	109.3981	
ZDV	38.9898	109.9833	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = MEM	arrival aprt = LAX	num_fix = 16
MEM	35.0497	89.9697	
LIT	34.6775	92.1803	
ZME	35.0628	94.9977	
KLUBB	35.1202	95.4669	
DWINE	35.2027	96.1691	
IRW	35.3586	97.6092	
SERTS	35.3543	98.8699	
ZFW	35.3333	100.0000	
AMA	35.2875	101.6393	
TCC	35.1821	103.5985	
ABQ	35.0438	106.8163	
ZUN	34.9658	109.1545	
PYRIT	34.8696	110.5114	
DRK	34.7025	112.4794	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	arpt = MIA	arrival aprt = LAX	num_fix = 28
MIA	25.8000	80.2833	
NEPTA	28.6108	87.6433	
ZJX	28.6978	88.0066	
SANTI	28.8502	88.6587	
LEV	29.1752	90.1040	
PEKON	29.6230	92.9242	
WEEVE	29.8402	94.4597	

IAH	29.9569	95.3457	
PUFER	30.2144	97.0988	
AUS	30.2975	97.7033	
SPURS	30.3935	98.3513	
JCT	30.5980	99.8175	
KEMPL	30.7204	100.8318	
ZHU	30.8789	102.2602	
FST	30.9521	102.9757	
FIGMO	31.5908	105.3819	
ELP	31.8072	106.3861	
ALIBY	31.9214	107.7789	
SSO	32.2692	109.2622	
BXK	33.4534	112.8246	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1122	115.7699	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	aprt = MKE	arrival aprt = LAX	num_fix = 14
MKE	42.9478	87.8944	
BAE	43.1197	88.2800	
MCW	43.1578	93.3306	
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4763	
DBL	39.4393	106.8947	
ZDV	38.6211	109.9833	
HVE	38.4168	110.6997	
BCE	37.7064	112.1447	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart	aprt = MSP	arrival aprt = LAX	num_fix = 15
MSP	44.8842	93.2139	
FSD	43.5786	96.7389	
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4763	
DBL	39.4393	106.8947	
ZDV	38.6211	109.9833	
HVE	38.4168	110.6997	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
GFS	35.1311	115.1756	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	

1 depart arpt = MSY	arrival arpt = LAX	num_fix =	16
MSY	30.0294	90.1719	
ACT	31.6108	97.2278	
INK	31.8748	103.2436	
ZFW	31.8884	103.6228	
CONNE	31.9342	105.3295	
EWM	31.9517	106.2724	
SSO	32.2692	109.2631	
BKK	33.4534	112.8246	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = ORD	arrival arpt = LAX	num_fix =	16
ORD	41.9822	87.9056	
JOT	41.5461	88.3183	
MZV	41.3208	90.6378	
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4763	
DBL	39.4393	106.8947	
ZDV	38.6211	109.9833	
HVE	38.4168	110.6997	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
GFS	35.1311	115.1756	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = PHL	arrival arpt = LAX	num_fix =	10
PHL	39.8697	75.2300	
BURNI	40.6568	77.8039	
ZDV	36.0291	111.7096	
TBC	36.1213	111.2696	
ABREE	34.7189	115.7184	
DIKES	34.6029	115.9870	
EMMEY	34.4160	116.4152	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = PHX	arrival arpt = LAX	num_fix =	10
PHX	33.4200	111.8797	
BKK	33.4250	112.6806	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1122	115.7699	

PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = PIT	arrival aprt = LAX	num_fix =	19
PIT	40.4936	80.2306	
AIR	40.0200	80.8197	
WINTS	40.0111	81.2309	
ZOB	40.0047	81.5953	
EMPTY	39.9633	83.1869	
CREEP	39.9209	84.3087	
VHP	39.8147	86.3676	
ZID	39.8684	88.1482	
GORDO	39.8757	88.4965	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
GLD	39.3800	101.6800	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = SAT	arrival aprt = LAX	num_fix =	11
SAT	29.6436	98.4608	
DILLI	31.7769	104.6956	
BXK	33.4250	112.6806	
MESSI	33.7998	113.8031	
ZAB	33.8682	114.0000	
PKE	34.1020	114.6821	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = SLC	arrival aprt = LAX	num_fix =	14
SLC	40.8500	111.9697	
MLF	38.4267	113.0111	
GEGEE	37.9664	113.3313	
BERYL	37.9001	113.8557	
ZLC	37.6599	113.5760	
NORRA	36.7593	114.2811	
OVETO	36.4605	114.5079	
BLD	35.9639	114.8514	
GFS	35.1311	115.1756	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = STL	arrival aprt = LAX	num_fix =	11

STL	38.8606	90.4822
FMN	36.7483	108.0981
COCAN	36.3125	110.3520
TBC	36.1213	111.2696
ZDV	36.0291	111.7096
PGS	35.6197	113.5300
TNP	34.1294	115.9389
PIONE	34.0945	116.7388
RUSTT	34.0492	117.2404
CIVET	34.0350	117.3889
LAX	33.9419	118.4056
1 depart arpt = TPA arrival aprt = LAX num_fix =		13
TPA	27.9736	82.5306
MSY	30.0294	90.1719
ALIBY	31.9214	107.7789
SSO	32.2692	109.2622
BXK	33.4534	112.8246
MESSI	33.7998	113.8031
ZAB	33.8682	114.0000
PKE	34.1020	114.6821
TNP	34.1122	115.7699
PIONE	34.0945	116.7388
RUSTT	34.0492	117.2404
CIVET	34.0350	117.3889
LAX	33.9419	118.4056
1 depart arpt = TUS arrival aprt = LAX num_fix =		10
TUS	32.1181	110.9417
CULTS	33.5842	113.5112
MESSI	33.7998	113.8031
ZAB	33.8682	114.0000
PKE	34.1020	114.6821
TNP	34.1294	115.9389
PIONE	34.0945	116.7388
RUSTT	34.0492	117.2404
CIVET	34.0350	117.3889
LAX	33.9419	118.4056
1 depart arpt = YYZ arrival aprt = LAX num_fix =		29
YYZ	43.6822	79.6428
DJB	41.3500	82.1500
MAYZE	41.4386	83.6641
NAPOL	41.4604	84.1521
ASHEN	41.4805	84.6468
ZOB	41.4895	84.8883
GSH	41.5252	86.0280
HOBAR	41.5418	87.2086
JOT	41.5464	88.3184
VORIN	41.5480	89.3364
IOW	41.5190	91.6133
CNOTA	41.4341	92.4901
ZAU	41.3227	93.5465
LNK	40.9238	96.7420
DRABS	40.7592	98.3747

ZMP	40.6847	99.0441	
HCT	40.4541	100.9236	
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4763	
DBL	39.4393	106.8947	
ZDV	38.6211	109.9833	
HVE	38.4168	110.6997	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
TNP	34.1294	115.9389	
PIONE	34.0945	116.7388	
RUSTT	34.0492	117.2404	
CIVET	34.0350	117.3889	
LAX	33.9419	118.4056	
1 depart arpt = LAX arrival arpt = ABQ num_fix =			11
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4330	111.9702	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0417	106.6056	
2 depart arpt = LAX arrival arpt = ABQ num_fix =			6
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
EED	34.7500	114.4697	
ZUN	34.9500	109.1500	
LAVAN	34.9083	107.3417	
ABQ	35.0417	106.6056	
3 depart arpt = LAX arrival arpt = ABQ num_fix =			9
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
EED	34.7660	114.4741	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
LAVAN	34.9083	107.3417	
ABQ	35.0417	106.6056	
1 depart arpt = LAX arrival arpt = ATL num_fix =			14
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4330	111.9702	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	

SJN	34.5208	109.3778	
CNX	34.3670	105.6780	
TXO	34.4951	102.8397	
ZFW	34.9515	100.2594	
IRW	35.3583	97.6089	
ATL	33.6392	84.4250	
2 depart	arpt = LAX	arrival appt = ATL	num_fix = 17
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
EED	34.7500	114.4697	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0438	106.8163	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3586	97.6092	
FSM	35.3883	94.2717	
MEM	35.0497	89.9697	
RMG	34.3506	85.1556	
ATL	33.6392	84.4250	
3 depart	arpt = LAX	arrival appt = ATL	num_fix = 14
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
EED	34.7660	114.4741	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0438	106.8163	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3583	97.6089	
ATL	33.6392	84.4250	
1 depart	arpt = LAX	arrival appt = BOS	num_fix = 31
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
NORRA	36.7593	114.2811	
ZLC	37.6599	113.5760	
BERYL	37.9001	113.3857	
GEGEE	37.9664	113.3313	
MLF	38.4267	113.0111	
OCS	41.5902	109.0153	
ZDV	42.6606	107.0880	
DDY	43.0909	106.2770	

RAP	43.9761	103.0123		
ZMP	44.4848	101.4668		
ABR	45.4172	98.3683		
GEP	45.1300	93.3700		
GRB	44.4878	88.1278		
PECOK	44.0078	85.7210		
ZOB	43.6896	84.4019		
DIRKS	43.4993	83.6480		
ECK	43.2500	82.7197		
ZOB	43.2030	82.3213		
ZOB	42.9507	79.0582		
BUF	42.9290	78.6463		
HANKK	42.8954	77.1714		
ZBW	42.8796	76.6673		
AUDIL	42.8719	76.4431		
FABEN	42.8533	75.9522		
ALB	42.7469	73.8036		
GDM	42.5300	72.0497		
BOS	42.3500	70.9800		
2 depart	arpt = LAX	arrival appt = BOS	num_fix =	38
LAX	33.9419	118.4056		
HEC	34.7800	116.4500		
EED	34.7660	114.4741		
ZAB	34.7503	113.8722		
DRK	34.7025	112.4794		
ZDV	35.7086	110.3965		
FMN	36.7484	108.0989		
HBU	38.4521	107.0397		
ELBEC	38.6928	106.5051		
ACREE	38.9056	106.0249		
SHREW	39.1691	105.6948		
BYSON	39.3708	105.4393		
DEN	39.8003	104.8867		
RAP	43.9697	103.0000		
ZMP	43.9254	101.4245		
VIVID	43.8605	99.9876		
FSD	43.5786	96.7389		
HAYNS	43.4291	95.3229		
MCW	43.0947	93.3299		
ZAU	43.1302	91.3218		
SABBO	43.1315	91.1687		
SIBER	43.1347	90.3927		
DUTYS	43.1306	89.3350		
BAE	43.1169	88.2844		
GRUBB	43.2243	85.3398		
ZOB	43.2317	85.0000		
EJOYS	43.2533	83.4836		
ECK	43.2559	82.7179		
ZOB	43.2030	82.3213		
ZOB	42.9507	79.0582		
BUF	42.9290	78.6463		
HANKK	42.8954	77.1714		

ZBW	42.8796	76.6673	
AUDIL	42.8719	76.4431	
FABEN	42.8533	75.9522	
ALB	42.7473	73.8032	
GDM	42.5300	72.0497	
BOS	42.3500	70.9800	
1 depart	arpt = LAX	arrival aprt = BNA	num_fix = 16
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4330	111.9702	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.5208	109.3778	
CNX	34.3670	105.6780	
TXO	34.4951	102.8397	
ZFW	34.9515	100.2594	
IRW	35.3583	97.6089	
ARG	36.1250	90.9250	
KIMEL	36.1278	90.0825	
BNA	36.1197	86.6700	
2 depart	arpt = LAX	arrival aprt = BNA	num_fix = 16
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
EED	34.7660	114.4741	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0438	106.8163	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3583	97.6089	
ARG	36.1250	90.9250	
KIMEL	36.1278	90.0825	
BNA	36.1197	86.6700	
1 depart	arpt = LAX	arrival aprt = BWI	num_fix = 20
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	
HLC	39.2588	100.2259	
ZKC	39.2834	99.1685	
ZARDO	39.3024	97.5688	
SLOWR	39.3032	97.3821	

ANGEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8919	89.6253		
MGW	39.5497	79.8497		
EMI	39.4797	76.9697		
BWI	39.1750	76.6694		
2 depart	aprt = LAX	arrival aprt = BWI	num_fix =	22
LAX	33.9419	118.4056		
DAG	34.8539	116.7861		
CLARR	35.6758	115.6796		
LAS	36.0797	115.1598		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8919	89.6253		
ROD	40.2800	84.0300		
MGW	39.5497	79.8497		
EMI	39.4797	76.9697		
BWI	39.1750	76.6694		
1 depart	aprt = LAX	arrival aprt = CLE	num_fix =	21
LAX	33.9419	118.4056		
HEC	34.7800	116.4500		
BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3879	101.6923		
ZMP	40.2417	99.0531		
LNK	40.9238	96.7420		
ZAU	41.3227	93.5465		
CNOTA	41.4341	92.4901		
IOW	41.6392	91.5444		
VORIN	41.5480	89.3364		
JOT	41.5461	88.3183		
GIJ	41.7686	86.3184		
PLAIN	41.7777	85.2067		
ZOB	41.7988	84.8551		
GERBS	41.7775	84.4250		
VWV	41.4514	83.6386		

WAKEM	41.2800	82.4772	
CLE	41.4103	81.8472	
2 depart	arpt = LAX	arrival aprt = CLE	num_fix = 23
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3879	101.6923	
ZMP	40.2417	99.0531	
LNK	40.9238	96.7420	
ZAU	41.3227	93.5465	
CNOTA	41.4341	92.4901	
IOW	41.6392	91.5444	
VORIN	41.5480	89.3364	
JOT	41.5461	88.3183	
GIJ	41.7686	86.3184	
PLAIN	41.7777	85.2067	
ZOB	41.7988	84.8551	
GERBS	41.7775	84.4250	
VWV	41.4514	83.6386	
PLAER	41.2282	82.6876	
WAKEM	41.2800	82.4772	
CLE	41.4103	81.8472	
1 depart	arpt = LAX	arrival aprt = CLT	num_fix = 20
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4330	111.9702	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0417	106.6056	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3583	97.6089	
FSM	35.3361	94.3667	
ARG	36.1250	90.9250	
TYS	35.8125	83.9917	
CLT	35.2025	80.9558	
1 depart	arpt = LAX	arrival aprt = CMH	num_fix = 22
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	

ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
AGNEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7373	91.0492		
CAP	39.8919	89.6253		
BVT	40.5558	87.0692		
ROD	40.2800	84.0300		
GUNNE	40.3636	83.2328		
CMH	39.9797	82.8797		
2 depart	arprt = LAX	arrival aprt = CMH	num_fix =	22
LAX	33.9419	118.4056		
DAG	34.8539	116.7861		
CLARR	35.6758	115.6796		
LAS	36.0797	115.1598		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8919	89.6253		
BVT	40.5558	87.0692		
ROD	40.2800	84.0300		
GUNNE	40.3636	83.2328		
CMH	39.9797	82.8797		
1 depart	arprt = LAX	arrival aprt = CVG	num_fix =	23
LAX	33.9419	118.4056		
TRM	33.6281	116.1592		
BLH	33.5797	114.7500		
SALOM	33.5162	113.8889		
KOFFA	33.4636	113.3489		
PXR	33.4578	111.9922		
BOLIC	34.0112	110.3517		
VERNO	34.2607	109.6272		
SJN	34.4241	109.1435		
LAVAN	34.9084	107.3424		

ABQ	35.0438	106.8163	
LVS	35.6576	105.1356	
ZKC	37.1586	102.2740	
DRAWL	37.4854	101.6173	
GCK	37.9300	100.7250	
PEABO	38.1503	97.3752	
FRACA	38.1823	96.7591	
BUM	38.2721	94.4882	
SCAWT	38.3553	93.9779	
ELSTO	38.6362	92.1309	
TRAKE	38.6919	91.7428	
STL	38.8606	90.4822	
QUEEN	37.0819	115.0761	
2 depart	arpt = LAX	arrival aprt = CVG	num_fix = 14
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
PUB	38.2800	104.4200	
HYS	38.8461	99.2722	
SLN	38.9264	97.6212	
JUDGE	39.0153	96.9212	
MKC	39.2794	94.5914	
DRIVL	39.1893	93.5709	
WELTS	39.0081	91.7711	
STL	38.8606	90.4822	
CVG	39.0489	84.6639	
3 depart	arpt = LAX	arrival aprt = CVG	num_fix = 15
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
PUB	38.2800	104.4200	
HYS	38.8461	99.2722	
SLN	38.9264	97.6212	
JUDGE	39.0153	96.9212	
MKC	39.2794	94.5914	
DRIVL	39.1893	93.5709	
WELTS	39.0081	91.7711	
STL	38.8606	90.4822	
CVG	39.0489	84.6639	
1 depart	arpt = LAX	arrival aprt = DAY	num_fix = 20
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	

HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.1231	94.5917		
DRIVL	39.1893	93.5709		
WELTS	39.0081	91.7711		
STL	38.8606	90.4822		
BIB	38.9203	88.4817		
SHB	39.6197	85.8197		
RID	39.7564	84.8417		
DAY	39.9017	84.2194		
2 depart	arpt = LAX	arrival aprt = DAY	num_fix =	21
LAX	33.9419	118.4056		
DAG	34.8539	116.7861		
CLARR	35.6758	115.6796		
LAS	36.0797	115.1598		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.1231	94.5917		
DRIVL	39.1893	93.5709		
WELTS	39.0081	91.7711		
STL	38.8606	90.4822		
BIB	38.9203	88.4817		
SHB	39.6197	85.8197		
RID	39.7564	84.8417		
DAY	39.9017	84.2194		
1 depart	arpt = LAX	arrival aprt = DEN	num_fix =	11
LAX	33.9419	118.4056		
HEC	34.7800	116.4500		
BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4519	107.0389		
ELBEC	38.6928	106.5051		
ACREE	38.9056	106.0249		
SHREW	39.1691	105.6948		
BYSON	39.3706	105.4386		
DEN	39.8003	104.8867		
2 depart	arpt = LAX	arrival aprt = DEN	num_fix =	17
LAX	33.9419	118.4056		
IPL	32.7486	115.5075		
BZA	32.7681	114.6028		
ZAB	32.7756	114.0000		

MOHAK	32.7759	113.9724	
GBN	32.9563	112.6743	
PXR	33.4578	111.9922	
INW	35.0616	110.7950	
DILCO	35.5313	110.0654	
ZDV	35.8024	109.6370	
FMN	36.7483	108.0981	
HBU	38.4521	107.0397	
ELBEC	38.6928	106.5051	
ACREE	38.9056	106.0249	
SHREW	39.1691	105.6948	
BYSON	39.3708	105.4393	
DEN	39.8003	104.8867	
3 depart	arpt = LAX	arrival apt = DEN	num_fix = 11
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4519	107.0389	
ELBEC	38.6928	106.5051	
ACREE	38.9056	106.0249	
SHREW	39.1691	105.6948	
DEN	39.8003	104.8867	
1 depart	arpt = LAX	arrival apt = DFW	num_fix = 16
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5961	114.7612	
ZAB	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
TFD	32.8856	111.9078	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2622	
EWM	31.9517	106.2724	
CONNE	31.9342	105.3295	
ZFW	31.8884	103.6228	
INK	31.7792	103.2028	
AQN	32.4344	97.6636	
DFW	32.8964	97.0333	
2 depart	arpt = LAX	arrival apt = DFW	num_fix = 16
LAX	33.9419	118.4056	
IPL	32.7486	115.5075	
BZA	32.7681	114.6028	
ZAB	32.7756	114.0000	
MOHAK	32.7759	113.9724	
GBN	32.9500	112.6700	
TFD	32.8859	111.9087	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	

SSO	32.2692	109.2622	
EWM	31.9517	106.2724	
CONNE	31.9342	105.3295	
ZFW	31.8884	103.6228	
INK	31.7792	103.2028	
AQN	32.4344	97.6636	
DFW	32.8964	97.0333	
3 depart	arprt = LAX	arrival aprt = DFW	num_fix = 15
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
EED	34.7660	114.4741	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0417	106.6056	
MIERA	34.9569	106.1141	
TXO	34.4951	102.8397	
ZFW	34.4609	102.5072	
TURKI	34.2933	100.9947	
SPS	33.9873	98.5935	
BATIK	33.4876	97.8876	
DFW	32.8964	97.0333	
4 depart	arprt = LAX	arrival aprt = DFW	num_fix = 15
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
EED	34.7500	114.4697	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0417	106.6056	
MIERA	34.9569	106.1141	
TXO	34.4951	102.8397	
ZFW	34.4609	102.5072	
TURKI	34.2933	100.9947	
SPS	33.9873	98.5935	
BATIK	33.4876	97.8876	
DFW	32.8964	97.0333	
1 depart	arprt = LAX	arrival aprt = DTW	num_fix = 30
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
NORRA	36.7593	114.2811	
ZLC	37.5008	112.7142	
BCE	37.6892	112.3039	
ZDV	38.9898	109.9833	
CISCO	39.3033	109.3981	
EKR	40.0675	107.9249	
VIKNN	40.9670	103.6758	
SNY	41.0967	102.9830	

ZMP	41.3467	99.0304	
OBH	41.3757	98.3536	
DEFIN	41.8423	95.3587	
ASTRO	42.0865	93.5258	
ZAU	42.1167	93.2809	
DBQ	42.4028	90.7083	
BAE	43.1197	88.2800	
MKG	43.1692	86.0392	
CLOCK	43.1457	85.5961	
GIBER	43.1216	85.1729	
ZOB	43.1113	85.0000	
PALOW	43.1051	84.8986	
TP	43.1001	84.8180	
CUTTY	43.0880	84.7169	
LUGGS	43.0547	84.4431	
OWOSO	43.0118	84.0990	
POLAR	42.8372	83.7353	
DTW	42.2186	83.3472	
2 depart arpt = LAX arrival aprt = DTW num_fix =			17
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	
ZMP	40.9856	99.0379	
OBH	41.3756	98.3531	
DEFIN	41.8423	95.3587	
ASTRO	42.0865	93.5258	
ZAU	42.1167	93.2809	
DBQ	42.4028	90.7083	
BAE	43.1197	88.2800	
MKG	43.1692	86.0392	
DTW	42.2186	83.3472	
3 depart arpt = LAX arrival aprt = DTW num_fix =			14
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	
ZMP	40.9856	99.0379	
OBH	41.3756	98.3531	
DEFIN	41.8423	95.3587	
ASTRO	42.0865	93.5258	
ZAU	42.1167	93.2809	
DBQ	42.4028	90.7083	
DTW	42.2186	83.3472	
1 depart arpt = LAX arrival aprt = ELP num_fix =			10

LAX	33.9419	118.4056
TRM	33.6281	116.1592
BLH	33.5961	114.7612
ZAB	33.5267	114.0000
SALOM	33.5162	113.8889
KOFFA	33.4636	113.3489
GBN	32.9500	112.6700
SSO	32.2692	109.2622
ALIBY	31.9214	107.7789
ELP	31.8072	106.3861
1 depart	arpt = LAX	arrival aprt = EWR num_fix = 30
LAX	33.9419	118.4056
DAG	34.8539	116.7861
CLARR	35.6758	115.6796
LAS	36.0797	115.1598
NORRA	36.7593	114.2811
ZLC	37.5008	112.7142
BCE	37.6892	112.3039
ZDV	38.9898	109.9833
CISCO	39.3033	109.3981
EKR	40.0675	107.9249
VIKNN	40.9670	103.6758
SNY	41.0967	102.9830
ZMP	41.3467	99.0304
OBH	41.3756	98.3531
DSM	41.4376	93.6486
ZAU	41.4444	93.5064
IOW	41.6392	91.5444
VORIN	41.5480	89.3364
JOT	41.5461	88.3183
GIJ	41.7697	86.3194
BENJO	41.8798	85.2091
ZOB	41.9066	85.0000
CRL	42.0300	83.4500
BUYKK	41.9551	82.2677
KEEHO	41.9176	81.8310
BEELR	41.8654	81.2517
DORET	41.8016	80.5846
BRIAR	41.5393	78.1892
SLT	41.5125	77.9703
EWR	40.6944	74.1667
2 depart	arpt = LAX	arrival aprt = EWR num_fix = 32
LAX	33.9419	118.4056
HEC	34.7800	116.4500
EED	34.7660	114.4741
ZAB	34.7503	113.8722
DRK	34.7025	112.4794
ZDV	35.7086	110.3965
FMN	36.7484	108.0989
HBU	38.4521	107.0397
ELBEC	38.6928	106.5051
ACREE	38.9056	106.0249

SHREW	39.1691	105.6948		
BYSON	39.3708	105.4393		
DEN	39.8003	104.8867		
HCT	40.4541	100.9236		
ZMP	41.1395	99.0348		
OBH	41.3756	98.3531		
DSM	41.4376	93.6486		
ZAU	41.4444	93.5064		
IOW	41.6392	91.5444		
VORIN	41.5480	89.3364		
JOT	41.5461	88.3183		
GIJ	41.7697	86.3194		
BENJO	41.8798	85.2091		
ZOB	41.9066	85.0000		
CRL	42.0300	83.4500		
BUYKK	41.9551	82.2677		
KEEHO	41.9176	81.8310		
BEELR	41.8654	81.2517		
DORET	41.8016	80.5846		
BRIAR	41.5393	78.1892		
SLT	41.5125	77.9703		
EWR	40.6944	74.1667		
3 depart	arpt = LAX	arrival appt = EWR	num_fix =	36
LAX	33.9419	118.4056		
IPL	32.7486	115.5075		
BZA	32.7681	114.6028		
ZAB	32.7756	114.0000		
MOHAK	32.7759	113.9724		
GBN	32.9563	112.6743		
PXR	33.4578	111.9922		
INW	35.0616	110.7950		
DILCO	35.5313	110.0654		
ZDV	35.8024	109.6370		
FMN	36.7483	108.0981		
HBU	38.4521	107.0397		
ELBEC	38.6928	106.5051		
ACREE	38.9056	106.0249		
SHREW	39.1691	105.6948		
BYSON	39.3708	105.4393		
DEN	39.8003	104.8867		
HCT	40.4541	100.9236		
ZMP	41.1395	99.0348		
OBH	41.3756	98.3531		
DSM	41.4376	93.6486		
ZAU	41.4444	93.5064		
IOW	41.6392	91.5444		
VORIN	41.5480	89.3364		
JOT	41.5461	88.3183		
GIJ	41.7697	86.3194		
BENJO	41.8798	85.2091		
ZOB	41.9066	85.0000		
CRL	42.0300	83.4500		

BUYKK	41.9551	82.2677		
KEEHO	41.9176	81.8310		
BEELR	41.8654	81.2517		
DORET	41.8016	80.5846		
BRIAR	41.5393	78.1892		
SLT	41.5125	77.9703		
EWR	40.6944	74.1667		
1 depart	arpt = LAX	arrival aprt = IAD	num_fix =	22
LAX	33.9419	118.4056		
HEC	34.7800	116.4500		
BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8086	108.9306		
HGO	38.8150	103.6256		
BOYET	38.8277	103.0932		
OATHE	38.8549	101.7943		
ZKC	38.8535	100.0165		
HYS	38.8476	99.2768		
SLN	38.9264	97.6212		
JUDGE	39.0153	96.9212		
MKC	39.2794	94.5914		
DRIVL	39.1893	93.5709		
WELTS	39.0081	91.7711		
STL	38.8606	90.4822		
BOSIE	38.6625	89.0506		
ELIOE	38.4985	87.9568		
ZID	38.4931	87.9221		
IMPEL	38.3596	87.0830		
IIU	38.1033	85.5775		
IAD	38.9436	77.4528		
2 depart	arpt = LAX	arrival aprt = IAD	num_fix =	24
LAX	33.9419	118.4056		
HEC	34.7800	116.4500		
BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
ZMP	39.8246	98.9785		
PWE	40.2000	96.2000		
LMN	40.5967	93.9676		
ZAU	40.6631	93.5148		
JAVAS	40.7656	92.7888		
ALBRT	40.8414	92.2283		
BURKK	40.9691	91.2308		
YOUDO	41.0544	90.5221		
BDF	41.1597	89.5879		
WHETT	41.1600	86.5839		
ZID	40.7012	84.6833		
APE	40.1511	82.5883		
OTMAN	39.9470	81.9043		
ZOB	39.8443	81.5667		

LUISE	39.5742	80.6985	
BUCKO	39.2936	79.8253	
IAD	38.9436	77.4528	
3 depart arpt = LAX arrival aprt = IAD num_fix =	25		
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	
ZMP	39.8246	98.9785	
PWE	40.2000	96.2000	
LMN	40.5967	93.9676	
ZAU	40.6631	93.5148	
JAVAS	40.7656	92.7888	
ALBRT	40.8414	92.2283	
BURKK	40.9691	91.2308	
YOUNDO	41.0544	90.5221	
BDF	41.1597	89.5879	
WHETT	41.1600	86.5839	
ZID	40.7012	84.6833	
APE	40.1511	82.5883	
OTMAN	39.9470	81.9043	
ZOB	39.8443	81.5667	
LUISE	39.5742	80.6985	
BUCKO	39.2936	79.8253	
IAD	38.9436	77.4528	
1 depart arpt = LAX arrival aprt = IAH num_fix =	19		
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
ZAB	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
GBN	32.9563	112.6743	
TFD	32.8859	111.9087	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2622	
ELP	31.8072	106.3861	
FIGMO	31.5908	105.3819	
FST	30.9521	102.9757	
ZHU	30.8789	102.2602	
KEMPL	30.7204	100.8318	
JCT	30.5083	99.7667	
CUGAR	30.2847	95.6010	
IAH	29.9497	95.3297	
1 depart arpt = LAX arrival aprt = IND num_fix =	21		
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	

BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8922	89.6254		
GORDO	39.8757	88.4965		
ZID	39.8684	88.1482		
VHP	39.7997	86.3700		
IND	39.7197	86.2697		
2 depart	arprt = LAX	arrival aprt = IND	num_fix =	22
LAX	33.9419	118.4056		
DAG	34.8539	116.7861		
CLARR	35.6758	115.6796		
LAS	36.0797	115.1598		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3800	101.6800		
HLC	39.2588	100.2259		
ZKC	39.2834	99.1685		
ZARDO	39.3024	97.5688		
SLOWR	39.3032	97.3821		
ANGEY	39.3035	96.6660		
MKC	39.2794	94.5914		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8922	89.6254		
GORDO	39.8757	88.4965		
ZID	39.8684	88.1482		
VHP	39.7997	86.3700		
IND	39.7197	86.2697		
1 depart	arprt = LAX	arrival aprt = JFK	num_fix =	31
LAX	33.9419	118.4056		
DAG	34.8539	116.7861		
CLARR	35.6758	115.6796		
LAS	36.0797	115.1598		
NORRA	36.7593	114.2811		
ZLC	37.5008	112.7142		
BCE	37.6892	112.3039		
ZDV	38.9898	109.9833		
CISCO	39.3033	109.3981		

EKR	40.0675	107.9249		
VIKNN	40.9670	103.6758		
SNY	41.0967	102.9830		
ZMP	41.3467	99.0304		
OBH	41.3757	98.3536		
DEFIN	41.8423	95.3587		
ASTRO	42.0865	93.5258		
ZAU	42.1167	93.2809		
DBQ	42.4015	90.7091		
COTON	42.3197	89.3091		
OBK	42.2197	87.9500		
UNBAR	42.0484	85.2131		
ZOB	42.0319	85.0000		
CRL	42.0300	83.4500		
COHOW	42.1566	80.6942		
SURLY	42.1631	80.4463		
JHW	42.1797	79.1200		
HOXIE	41.8650	77.8526		
ZNY	41.7684	77.4864		
AVP	41.2700	75.6800		
LENDY	40.9147	74.1356		
JFK	40.6197	73.7697		
2 depart	arpt = LAX	arrival arpt = JFK	num_fix =	36
LAX	33.9419	118.4056		
TRM	33.6281	116.1592		
BLH	33.5797	114.7500		
SALOM	33.5162	113.8889		
KOFFA	33.4636	113.3489		
PXR	33.4578	111.9922		
INW	35.0616	110.7950		
DILCO	35.5313	110.0654		
ZDV	35.8024	109.6370		
FMN	36.7483	108.0981		
HBU	38.4521	107.0397		
ELBEC	38.6928	106.5051		
ACREE	38.9056	106.0249		
SHREW	39.1691	105.6948		
BYSON	39.3708	105.4393		
DEN	39.8003	104.8867		
HCT	40.4541	100.9236		
ZMP	41.1395	99.0348		
OBH	41.3757	98.3536		
DEFIN	41.8423	95.3587		
ASTRO	42.0865	93.5258		
ZAU	42.1167	93.2809		
DBQ	42.4015	90.7091		
COTON	42.3197	89.3091		
OBK	42.2197	87.9500		
UNBAR	42.0484	85.2131		
ZOB	42.0319	85.0000		
CRL	42.0300	83.4500		
COHOW	42.1566	80.6942		

SURLY	42.1631	80.4463	
JHW	42.1797	79.1200	
HOXIE	41.8650	77.8526	
ZNY	41.7684	77.4864	
AVP	41.2700	75.6800	
LENDY	40.9147	74.1356	
JFK	40.6197	73.7697	
3 depart	arpt = LAX	arrival aprt = JFK	num_fix = 37
LAX	33.9419	118.4056	
IPL	32.7486	115.5075	
BZA	32.7681	114.6028	
ZAB	32.7756	114.0000	
MOHAK	32.7759	113.9724	
GBN	32.9563	112.6743	
PXR	33.4578	111.9922	
INW	35.0616	110.7950	
DILCO	35.5313	110.0654	
ZDV	35.8024	109.6370	
FMN	36.7483	108.0981	
HBU	38.4521	107.0397	
ELBEC	38.6928	106.5051	
ACREE	38.9056	106.0249	
SHREW	39.1691	105.6948	
BYSON	39.3708	105.4393	
DEN	39.8003	104.8867	
HCT	40.4541	100.9236	
ZMP	41.1395	99.0348	
OBH	41.3757	98.3536	
DEFIN	41.8423	95.3587	
ASTRO	42.0865	93.5258	
ZAU	42.1167	93.2809	
DBQ	42.4015	90.7091	
COTON	42.3197	89.3091	
OBK	42.2197	87.9500	
UNBAR	42.0484	85.2131	
ZOB	42.0319	85.0000	
CRL	42.0300	83.4500	
COHOW	42.1566	80.6942	
SURLY	42.1631	80.4463	
JHW	42.1797	79.1200	
HOXIE	41.8650	77.8526	
ZNY	41.7684	77.4864	
AVP	41.2700	75.6800	
LENDY	40.9147	74.1356	
JFK	40.6197	73.7697	
4 depart	arpt = LAX	arrival aprt = JFK	num_fix = 25
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	

HGO	38.8150	103.6261
GLD	39.3800	101.6800
ZMP	40.2417	99.0531
LNK	40.9238	96.7420
ZAU	41.3227	93.5465
CNOTA	41.4341	92.4901
IOW	41.5190	91.6133
VORIN	41.5480	89.3364
JOT	41.5464	88.3184
GIJ	41.7697	86.3194
BENJO	41.8798	85.2091
ZOB	41.9066	85.0000
CRL	42.0481	83.4576
COHOW	42.1566	80.6942
SURLY	42.1631	80.4463
JHW	42.1797	79.1200
AVP	41.2700	75.6800
LENDY	40.9147	74.1356
JFK	40.6197	73.7697
5 depart arpt = LAX arrival aprt = JFK num_fix =		26
LAX	33.9419	118.4056
HEC	34.7800	116.4500
BLD	35.9958	114.8636
ZDV	37.0778	111.7451
DVC	37.8086	108.9306
HGO	38.8150	103.6261
GLD	39.3800	101.6800
ZMP	40.2417	99.0531
LNK	40.9238	96.7420
ZAU	41.3227	93.5465
CNOTA	41.4341	92.4901
IOW	41.5190	91.6133
VORIN	41.5480	89.3364
JOT	41.5464	88.3184
GIJ	41.7697	86.3194
BENJO	41.8798	85.2091
ZOB	41.9066	85.0000
CRL	42.0481	83.4576
COHOW	42.1566	80.6942
SURLY	42.1631	80.4463
JHW	42.1797	79.1200
HOXIE	41.8650	77.8526
ZNY	41.7684	77.4864
AVP	41.2700	75.6800
LENDY	40.9147	74.1356
JFK	40.6197	73.7697
1 depart arpt = LAX arrival aprt = MCI num_fix =		14
LAX	33.9419	118.4056
TRM	33.6281	116.1592
BLH	33.5961	114.7612
ZAB	33.5267	114.0000
SALOM	33.5162	113.8889

KOFFA	33.4636	113.3489	
TFD	32.8859	111.9087	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2622	
EWM	31.9497	106.2697	
SJT	31.3581	100.4944	
CLL	30.6000	96.4200	
MCI	39.2992	94.7167	
1 depart	arpt = LAX	arrival aprt = MDW	num_fix = 20
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
HGO	38.8150	103.6256	
BOYET	38.8277	103.0932	
OATHE	38.8549	101.7943	
ZKC	38.8535	100.0165	
HYS	38.8476	99.2768	
SLN	38.7914	97.6500	
AGENT	39.6357	94.8023	
KIDER	39.7817	94.1783	
IRK	40.0922	92.5417	
COLIE	40.2806	92.1839	
LOAMY	40.4245	91.7843	
KEOKK	40.5534	91.4037	
ZAU	40.6137	91.2282	
BDF	41.2308	89.6156	
MDW	41.7858	87.7500	
2 depart	arpt = LAX	arrival aprt = MDW	num_fix = 21
LAX	33.9419	118.4056	
DAG	34.9624	116.5782	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
HGO	38.8150	103.6256	
BOYET	38.8277	103.0932	
OATHE	38.8549	101.7943	
ZKC	38.8535	100.0165	
HYS	38.8476	99.2768	
SLN	38.7914	97.6500	
AGENT	39.6357	94.8023	
KIDER	39.7817	94.1783	
IRK	40.0922	92.5417	
COLIE	40.2806	92.1839	
LOAMY	40.4245	91.7843	
KEOKK	40.5534	91.4037	
ZAU	40.6137	91.2282	
BDF	41.2308	89.6156	
MDW	41.7858	87.7500	

1 depart arpt = LAX	arrival aprt = MEM	num_fix =	18
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4578	111.9922	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0417	106.6056	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3583	97.6089	
FSM	35.3361	94.3667	
MEM	35.0497	89.9697	
2 depart arpt = LAX	arrival aprt = MEM	num_fix =	16
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
EED	34.7660	114.4741	
ZAB	34.7503	113.8722	
DRK	34.7026	112.4802	
PYRIT	34.8696	110.5114	
ZUN	34.9658	109.1545	
ABQ	35.0438	106.8163	
TCC	35.1821	103.5985	
AMA	35.2875	101.6393	
ZFW	35.3333	100.0000	
SERTS	35.3543	98.8699	
IRW	35.3583	97.6089	
FSM	35.3361	94.3667	
GQE	35.3469	90.4781	
MEM	35.0497	89.9697	
1 depart arpt = LAX	arrival aprt = MIA	num_fix =	30
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5961	114.7612	
ZAB	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
TFD	32.8856	111.9078	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2631	
ALIBY	31.9214	107.7789	
ELP	31.8072	106.3861	
FIGMO	31.5908	105.3819	
FST	30.9521	102.9757	
ZHU	30.8789	102.2602	

KEMPL	30.7204	100.8318	
JCT	30.5980	99.8175	
SPURS	30.3935	98.3513	
AUS	30.2975	97.7033	
PUFER	30.2144	97.0988	
IAH	29.9569	95.3457	
WEEVE	29.8402	94.4597	
PEKON	29.6230	92.9242	
LEV	29.1752	90.1040	
SANTI	28.8502	88.6587	
ZJX	28.6978	88.0066	
NEPTA	28.6108	87.6412	
ZMA	27.9898	84.9619	
COVIA	27.9358	84.7361	
MIA	25.8000	80.2833	
1 depart	aprt = LAX	arrival aprt = MKE	num_fix = 23
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
NORRA	36.7593	114.2811	
ZLC	37.5008	112.7142	
BCE	37.6892	112.3039	
ZDV	38.9898	109.9833	
CISCO	39.3033	109.3981	
EKR	40.0675	107.9249	
VIKNN	40.9670	103.6758	
SNY	41.0967	102.9830	
ZMP	41.3467	99.0304	
OBH	41.3757	98.3536	
DEFIN	41.8423	95.3587	
ASTRO	42.0865	93.5258	
ZAU	42.1167	93.2809	
DBQ	42.4028	90.7083	
JVL	42.6197	89.0389	
JAYBE	42.6442	88.6388	
TRUDO	42.6840	88.4198	
VEENA	42.7047	88.3036	
MKE	42.9478	87.8944	
1 depart	aprt = LAX	arrival aprt = MMPR	num_fix = 4
LAX	33.9419	118.4056	
MZB	32.7819	117.2244	
TIJ	32.5344	116.9506	
MMPR	20.0000	107.0000	
1 depart	aprt = LAX	arrival aprt = MSP	num_fix = 17
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
NORRA	36.7593	114.2811	
ZLC	37.5008	112.7142	
BCE	37.6892	112.3039	

ZDV	38.9898	109.9833	
CISCO	39.3033	109.3981	
EKR	40.0700	107.9200	
CYS	41.2000	104.7697	
ZMP	42.3581	99.3123	
ONL	42.4703	98.6864	
FSD	43.5786	96.7389	
RWF	44.5458	95.0806	
BUNKR	44.7117	94.3106	
MSP	44.8842	93.2139	
2 depart arpt = LAX arrival aprt = MSP num_fix =	17		
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4519	107.0389	
PARLI	38.5793	106.8429	
DEN	39.8003	104.8867	
KEANN	40.0993	104.2612	
SMITY	40.3111	103.8094	
PONNY	40.7518	102.8214	
ZMP	42.2585	99.2297	
ONL	42.4705	98.6869	
FSD	43.5786	96.7389	
RWF	44.5458	95.0806	
BUNKR	44.7117	94.3106	
MSP	44.8842	93.2139	
3 depart arpt = LAX arrival aprt = MSP num_fix =	18		
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4519	107.0389	
PARLI	38.5793	106.8429	
DEN	39.8003	104.8867	
KEANN	40.0993	104.2612	
SMITY	40.3111	103.8094	
PONNY	40.7518	102.8214	
ZMP	42.2585	99.2297	
ONL	42.4705	98.6869	
FSD	43.5786	96.7389	
RWF	44.5458	95.0806	
BUNKR	44.7117	94.3106	
MSP	44.8842	93.2139	
1 depart arpt = LAX arrival aprt = MSY num_fix =	24		
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5961	114.7612	
ZAB	33.5267	114.0000	

SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
TFD	32.8856	111.9078	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2631	
ALIBY	31.9214	107.7789	
ELP	31.8072	106.3861	
FIGMO	31.5908	105.3819	
FST	30.9521	102.9757	
ZHU	30.8789	102.2602	
KEMPL	30.7204	100.8318	
JCT	30.5980	99.8175	
SPURS	30.3935	98.3513	
AUS	30.2975	97.7033	
PUFER	30.2144	97.0988	
IAH	29.9497	95.3297	
LCH	30.1256	93.2222	
AWDAD	30.0794	90.9033	
MSY	30.0294	90.1719	
1 depart	arpt = LAX	arrival aprt = ORD	num_fix = 17
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1500	
NORRA	36.7593	114.2811	
ZLC	37.5008	112.7142	
BCE	37.7064	112.1447	
MTU	40.1450	110.1269	
OCS	41.5900	109.0144	
ZDV	41.6713	107.9272	
SIRLY	41.7393	106.8831	
BFF	41.8942	103.4820	
ZMP	42.4033	99.3499	
ONL	42.4703	98.6864	
MCW	43.1578	93.3306	
JVL	42.6197	89.0389	
ORD	41.9822	87.9056	
2 depart	arpt = LAX	arrival aprt = ORD	num_fix = 31
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
ZLA	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4578	111.9922	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0438	106.8163	
LVS	35.6576	105.1356	

ZKC	37.1586	102.2740	
DRAWL	37.4854	101.6173	
GCK	37.9191	100.7251	
SLN	38.7914	97.6500	
AGENT	39.6357	94.8023	
KIDER	39.7817	94.1783	
IRK	40.0922	92.5417	
COLIE	40.2806	92.1839	
LOAMY	40.4245	91.7843	
KEOKK	40.5534	91.4037	
ZAU	40.6137	91.2282	
BDF	41.2308	89.6156	
OWENA	41.3448	89.1939	
KELSI	41.4390	88.9914	
AHMED	41.4977	88.8644	
SHOOZ	41.5546	88.7409	
PLANO	41.6125	88.6147	
ORD	41.9822	87.9056	
3 depart	arpt = LAX	arrival apt = ORD	num_fix = 31
LAX	33.9419	118.4056	
IPL	32.7486	115.5075	
BZA	32.7681	114.6028	
ZAB	32.7756	114.0000	
MOHAK	32.7759	113.9724	
GBN	32.9563	112.6743	
PXR	33.4330	111.9702	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0438	106.8163	
LVS	35.6576	105.1356	
ZKC	37.1586	102.2740	
DRAWL	37.4854	101.6173	
GCK	37.9191	100.7251	
SLN	38.7914	97.6500	
AGENT	39.6357	94.8023	
KIDER	39.7817	94.1783	
IRK	40.0922	92.5417	
COLIE	40.2806	92.1839	
LOAMY	40.4245	91.7843	
KEOKK	40.5534	91.4037	
ZAU	40.6137	91.2282	
BDF	41.2308	89.6156	
OWENA	41.3448	89.1939	
KELSI	41.4390	88.9914	
AHMED	41.4977	88.8644	
SHOOZ	41.5546	88.7409	
PLANO	41.6647	88.5719	
ORD	41.9822	87.9056	
1 depart	arpt = LAX	arrival apt = PHL	num_fix = 27
LAX	33.9419	118.4056	

HEC	34.7800	116.4500		
BLD	35.9958	114.8636		
ZDV	37.0778	111.7451		
DVC	37.8088	108.9313		
HBU	38.4521	107.0397		
GLD	39.3879	101.6923		
ZMP	40.2417	99.0531		
LNK	40.9238	96.7420		
ZAU	41.3227	93.5465		
CNOTA	41.4341	92.4901		
IOW	41.6392	91.5444		
VORIN	41.5480	89.3364		
JOT	41.5464	88.3184		
HOBAR	41.5418	87.2086		
GSH	41.5252	86.0280		
ZOB	41.4895	84.8883		
ASHEN	41.4805	84.6468		
NAPOL	41.4604	84.1521		
MAYZE	41.4386	83.6641		
DJB	41.3581	82.1619		
PHATY	41.3016	81.5342		
HAGUD	41.1921	80.4161		
GRACE	40.8569	79.8006		
JST	40.3164	78.8333		
BUCKS	40.0803	75.7239		
PHL	39.8697	75.2300		
2 depart	arpt = LAX	arrival aprt = PHL	num_fix =	29
LAX	33.9419	118.4056		
TRM	33.6281	116.1592		
BLH	33.5797	114.7500		
ZAB	33.5267	114.0000		
SALOM	33.5162	113.8889		
KOFFA	33.4636	113.3489		
PXR	33.4578	111.9922		
CHEAR	34.3699	110.4712		
ZUN	34.9500	109.1500		
CIM	36.4797	104.8700		
ZKC	37.3553	102.4327		
GCK	37.9191	100.7251		
SLN	38.7914	97.6500		
JUDGE	39.0153	96.9212		
MKC	39.1231	94.5917		
SAAGS	39.4612	93.2931		
TWAIN	39.6911	91.4653		
BAYLI	39.7393	91.0492		
CAP	39.8922	89.6254		
GORDO	39.8757	88.4965		
ZID	39.8684	88.1482		
VHP	39.7997	86.3700		
ROD	40.2800	84.0300		
BLISS	40.3274	81.9727		
ZOB	40.3300	81.6775		

AVERE	40.3310	80.0573	
JST	40.3164	78.8333	
BUCKS	40.0803	75.7239	
PHL	39.8697	75.2300	
3 depart arpt = LAX arrival aprt = PHL num_fix =	28		
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3879	101.6923	
ZMP	40.2417	99.0531	
LNK	40.9238	96.7420	
ZAU	41.3227	93.5465	
CNOTA	41.4341	92.4901	
IOW	41.6392	91.5444	
VORIN	41.5480	89.3364	
JOT	41.5464	88.3184	
HOBAR	41.5418	87.2086	
GSH	41.5252	86.0280	
ZOB	41.4895	84.8883	
ASHEN	41.4805	84.6468	
NAPOL	41.4604	84.1521	
MAYZE	41.4386	83.6641	
DJB	41.3581	82.1619	
PHATY	41.3016	81.5342	
HAGUD	41.1921	80.4161	
GRACE	40.8569	79.8006	
JST	40.3164	78.8333	
BUCKS	40.0803	75.7239	
PHL	39.8697	75.2300	
1 depart arpt = LAX arrival aprt = PHX num_fix =	7		
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4578	111.9922	
PHX	33.4200	111.8797	
2 depart arpt = LAX arrival aprt = PHX num_fix =	6		
LAX	33.9419	118.4056	
IPL	32.7486	115.5075	
BZA	32.7681	114.6028	
ZAB	32.7756	114.0000	
MOHAK	32.7756	113.9714	
PHX	33.4200	111.8797	
3 depart arpt = LAX arrival aprt = PHX num_fix =	6		
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
EED	34.7500	114.4697	

ZAB	34.7503	113.8722	
DRK	34.7025	112.4794	
PHX	33.4200	111.8797	
1 depart	arpt = LAX	arrival aprt = PIT	num_fix = 24
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3879	101.6923	
ZMP	40.2417	99.0531	
LNK	40.9238	96.7420	
ZAU	41.3227	93.5465	
CNOTA	41.4341	92.4901	
IOW	41.6392	91.5444	
VORIN	41.5480	89.3364	
JOT	41.5461	88.3183	
GIJ	41.7686	86.3184	
PLAIN	41.7777	85.2067	
ZOB	41.7988	84.8551	
GERBS	41.7777	84.4251	
IDEAS	41.7714	83.5518	
DJB	41.3500	82.1500	
ACO	41.1078	81.2017	
DEFOE	41.0437	81.0458	
CUTTA	40.8761	80.6433	
PIT	40.4936	80.2306	
1 depart	arpt = LAX	arrival aprt = SAT	num_fix = 18
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
ZAB	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
GBN	32.9563	112.6743	
TFD	32.8859	111.9087	
TOTEC	32.8266	111.6422	
ITEMM	32.5865	110.5898	
SSO	32.2692	109.2622	
ELP	31.8072	106.3861	
FIGMO	31.5908	105.3819	
FST	30.9167	102.9167	
ZHU	30.7738	102.2887	
SHUCK	30.5076	101.2929	
CSI	29.9222	99.2139	
SAT	29.6436	98.4608	
1 depart	arpt = LAX	arrival aprt = SLC	num_fix = 11
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	

NORRA	36.7593	114.2811	
ZLC	37.6599	113.5760	
BERYL	37.9001	113.3857	
GEGEE	37.9664	113.3313	
MLF	38.3604	113.0132	
FFU	40.2700	111.9300	
SLC	40.8500	111.9697	
1 depart	arpt = LAX	arrival aprt = STL	num_fix = 19
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
PXR	33.4578	111.9922	
BOLIC	34.0112	110.3517	
VERNO	34.2607	109.6272	
SJN	34.4241	109.1435	
LAVAN	34.9084	107.3424	
ABQ	35.0438	106.8163	
LVS	35.6539	105.1417	
ZKC	36.9025	102.0689	
LBL	37.0444	100.9712	
ICT	37.7452	97.5838	
DOSOA	38.1867	95.0276	
BUM	38.2700	94.4800	
TRAKE	38.6917	91.7425	
STL	38.8606	90.4822	
2 depart	arpt = LAX	arrival aprt = STL	num_fix = 17
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	
GLD	39.3800	101.6800	
HLC	39.2588	100.2259	
ZKC	39.2834	99.1685	
ZARDO	39.3024	97.5688	
SLOWR	39.3032	97.3821	
ANGEY	39.3035	96.6660	
MKC	39.1231	94.5917	
DRIVL	39.1893	93.5709	
WELTS	39.0081	91.7711	
STL	38.8606	90.4822	
3 depart	arpt = LAX	arrival aprt = STL	num_fix = 14
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8088	108.9313	
HBU	38.4521	107.0397	

GLD	39.3800	101.6800	
HLC	39.2588	100.2259	
ZKC	39.2834	99.1685	
ZARDO	39.3024	97.5688	
SLOWR	39.3032	97.3821	
ANGEY	39.3035	96.6660	
MKC	39.2794	94.5914	
STL	38.8606	90.4822	
1 depart arpt = LAX arrival aprt = TPA num_fix =			8
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5797	114.7500	
BXK	33.4250	112.6806	
SSO	32.2692	109.2622	
ALIBY	31.9214	107.7789	
ELP	31.8072	106.3861	
TPA	27.9736	82.5306	
1 depart arpt = LAX arrival aprt = TUS num_fix =			9
LAX	33.9419	118.4056	
TRM	33.6281	116.1592	
BLH	33.5961	114.7612	
ZAB	33.5267	114.0000	
SALOM	33.5162	113.8889	
KOFFA	33.4636	113.3489	
GBN	32.9500	112.6700	
ALMON	32.3836	111.4948	
TUS	32.1181	110.9417	
2 depart arpt = LAX arrival aprt = TUS num_fix =			8
LAX	33.9419	118.4056	
IPL	32.7486	115.5075	
BZA	32.7681	114.6028	
ZAB	32.7756	114.0000	
MOHAK	32.7759	113.9724	
GBN	32.9500	112.6700	
ALMON	32.3836	111.4948	
TUS	32.1181	110.9417	
1 depart arpt = LAX arrival aprt = YYZ num_fix =			7
LAX	33.4919	118.4056	
DAG	34.8539	116.7861	
EKR	40.0700	107.9200	
CYS	41.2000	104.7697	
MCW	43.1578	93.5430	
ECK	43.2500	82.7197	
YYZ	43.6822	79.6428	
2 depart arpt = LAX arrival aprt = YYZ num_fix =			10
LAX	33.9419	118.4056	
HEC	34.7800	116.4500	
BLD	35.9958	114.8636	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
HGO	38.8150	103.6261	
GLD	39.3800	101.6800	

ZMP	40.2417	99.0531	
LNK	40.8506	96.7583	
YYZ	43.6822	79.6428	
3 depart arpt = LAX	arrival aprt = YYZ	num_fix =	16
LAX	33.9419	118.4056	
DAG	34.8539	116.7861	
CLARR	35.6758	115.6796	
LAS	36.0797	115.1598	
ZDV	37.0778	111.7451	
DVC	37.8086	108.9306	
HGO	38.8150	103.6261	
GLD	39.3800	101.6800	
ZMP	40.2417	99.0531	
LNK	40.8506	96.7583	
DSM	41.5347	93.6583	
ZAU	41.4894	93.4984	
DBQ	42.4028	90.7083	
BAE	43.1197	88.2800	
ECK	43.2500	82.7197	
YYZ	43.6822	79.6428	
1 depart arpt = SAN	arrival aprt = OAK	num_fix =	9
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
LAX	33.9419	118.4056	
GMN	34.7997	118.8497	
EHF	35.4844	119.0961	
PXN	36.7153	120.7775	
OAK	37.7197	122.2197	
1 depart arpt = SAN	arrival aprt = SJC	num_fix =	11
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
LAX	33.9419	118.4056	
FIM	34.3500	118.8700	
GMN	34.7997	118.8497	
TP	35.8500	119.9300	
SNS	36.6625	121.6028	
GILRO	37.0311	121.5700	
SJC	37.3647	121.9292	
1 depart arpt = SAN	arrival aprt = SFO	num_fix =	12
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
LAX	33.9419	118.4056	
AVE	35.6469	119.9775	
BSR	36.1811	121.6408	
CARME	36.4550	121.8786	
ANJEE	36.7464	121.9650	

SKUNK	37.0075	122.0331		
MENLO	37.4636	122.1536		
SFO	37.6194	122.3728		
1 depart	arpt = SAN	arrival aprt = BOS	num_fix =	32
SAN	32.7333	117.1861		
MZB	32.7819	117.2244		
PACIF	33.2858	117.7469		
BIGJO	33.3833	117.9833		
POM	34.0783	117.7861		
DAG	34.8539	116.7861		
CLARR	35.6756	115.6786		
LAS	36.0797	115.1500		
NORRA	36.7592	114.2803		
ZLC	37.6600	113.5761		
BERYL	37.9000	113.3847		
GEGEE	37.9664	113.3303		
MLF	38.4267	113.0111		
DDY	43.0917	106.2772		
RAP	43.9697	103.0000		
ZMP	44.4847	101.4667		
ABR	45.4172	98.3683		
GEP	45.1300	93.3700		
GRB	44.4878	88.1278		
PECOK	44.0078	85.7208		
ZOB	43.6897	84.4019		
DIRKS	43.4992	83.6481		
ECK	43.2500	82.7197		
ZOB	43.2031	82.3214		
ZOB	42.9508	79.0583		
BUF	42.9392	78.7333		
HANKK	42.8953	77.1714		
AUDIL	42.8717	76.4433		
FABEN	42.8531	75.9525		
ALB	42.7469	73.8036		
GDM	42.5300	72.0497		
BOS	42.3500	70.9800		
1 depart	arpt = SAN	arrival aprt = DEN	num_fix =	15
SAN	32.7333	117.1861		
MZB	32.7819	117.2244		
PACIF	33.2858	117.7469		
BIGJO	33.3833	117.9833		
POM	34.0783	117.7861		
DAG	34.8539	116.7861		
CLARR	35.6756	115.6786		
LAS	36.0797	115.1500		
ZDV	36.0292	111.7083		
DVC	37.8086	108.9306		
HBU	38.4519	107.0389		
ELBEC	38.6928	106.5044		
ACREE	38.9056	106.0242		
SHREW	39.1689	105.6942		
DEN	39.8003	104.8867		

1 depart arpt = SAN	arrival aprt = DFW	num_fix =	14
SAN	32.7333	117.1861	
IPL	32.7486	115.5075	
BZA	32.7700	114.5997	
ZAB	32.7756	114.0000	
MOHAK	32.7756	113.9714	
TFD	32.8856	111.9078	
TOTEC	32.8264	111.6414	
ITEMM	32.5844	110.5897	
SSO	32.2692	109.2622	
EWM	31.9497	106.2697	
CONNE	31.9339	105.3289	
ZFW	31.8883	103.6228	
AQN	32.4344	97.6636	
DFW	32.8964	97.0333	
1 depart arpt = SAN	arrival aprt = DTW	num_fix =	20
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
POM	34.0783	117.7861	
DAG	34.8539	116.7861	
CLARR	35.6756	115.6786	
LAS	36.0797	115.1500	
ZDV	36.0292	111.7083	
DVC	37.8086	108.9306	
HBU	38.4519	107.0389	
GLD	39.3800	101.6800	
OBH	41.3756	98.3531	
DEFIN	41.8422	95.3583	
ASTRO	42.0864	93.5256	
ZAU	42.1167	93.2808	
DBQ	42.4028	90.7083	
BAE	43.1197	88.2800	
MKG	43.1692	86.0392	
DTW	42.2186	83.3472	
1 depart arpt = SAN	arrival aprt = EWR	num_fix =	33
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
POM	34.0783	117.7861	
DAG	34.8539	116.7861	
CLARR	35.6756	115.6786	
LAS	36.0797	115.1500	
NORRA	36.7592	114.2803	
ZLC	37.5008	112.7142	
BCE	37.7064	112.1447	
CISCO	39.3033	109.3972	
EKR	40.0700	107.9200	
VIKNN	40.9669	103.6758	
SNY	41.1011	102.9833	

ZMP	41.3467	99.0303		
OBH	41.3756	98.3531		
DSM	41.5347	93.6583		
ZAU	41.4444	93.5064		
IOW	41.6392	91.5444		
VORIN	41.5478	89.3361		
JOT	41.5461	88.3183		
GIJ	41.7697	86.3194		
BENJO	41.8797	85.2089		
ZOB	41.9067	85.0000		
CRL	42.0300	83.4500		
BUYKK	41.9550	82.2678		
KEEHO	41.9178	81.0831		
BEELR	41.8653	81.2517		
DORET	41.8014	80.5847		
BRIAR	41.5392	78.1894		
SLT	41.5125	77.9703		
EWR	40.6944	74.1667		
1 depart	arpt = SAN	arrival aprt = SLC	num_fix =	15
SAN	32.7333	117.1861		
MZB	32.7819	117.2244		
PACIF	33.2858	117.7469		
BIGJO	33.3833	117.9833		
POM	34.0783	117.7861		
DAG	34.8539	116.7861		
CLARR	35.6756	115.6786		
LAS	36.0797	115.1500		
NORRA	36.7592	114.2803		
ZLC	37.6600	113.5761		
BERYL	37.9000	113.3847		
GEGEE	37.9664	113.3303		
MLF	38.4267	113.0111		
FFU	40.2700	111.9300		
SLC	40.8500	111.9697		
1 depart	arpt = SAN	arrival aprt = JFK	num_fix =	32
SAN	32.7333	117.1861		
MZB	32.7819	117.2244		
PACIF	33.2858	117.7469		
BIGJO	33.3833	117.9833		
POM	34.0783	117.7861		
DAG	34.8539	116.7861		
CLARR	35.6756	115.6786		
LAS	36.0797	115.1500		
NORRA	36.7592	114.2803		
ZLC	37.6600	113.5761		
CISCO	39.3033	109.3972		
EKR	40.0700	107.9200		
VIKNN	40.9669	103.6758		
SNY	41.1011	102.9833		
ZMP	41.3467	99.0303		
OBH	41.3756	98.3531		
DEFIN	41.8422	95.3583		

ASTRO	42.0864	93.5256	
ZAU	42.1167	93.2808	
DBQ	42.4028	90.7083	
COTON	42.3194	89.3089	
OBK	42.2197	87.9500	
UNBAR	42.0483	85.2131	
ZOB	42.0319	85.0000	
CRL	42.0300	83.4500	
COHOW	42.1564	80.6942	
SURLY	42.1631	80.4464	
JHW	42.1797	79.1200	
HOXIE	41.8975	77.8417	
AVP	41.2700	75.6800	
LENDY	40.9147	74.1356	
JFK	40.6197	73.7697	
1 depart arpt = SAN	arrival aprt = PHX	num_fix =	7
SAN	32.7333	117.1861	
IPL	32.7486	115.5075	
BZA	32.7700	114.5997	
ZAB	32.7756	114.0000	
MOHAK	32.7756	113.9714	
GBN	32.9500	112.6700	
PHX	33.4200	111.8797	
1 depart arpt = SAN	arrival aprt = ORD	num_fix =	19
SAN	32.7333	117.1861	
MZB	32.7819	117.2244	
PACIF	33.2858	117.7469	
BIGJO	33.3833	117.9833	
POM	34.0783	117.7861	
DAG	34.8539	116.7861	
CLARR	35.6756	115.6786	
LAS	36.0797	115.1500	
NORRA	36.7592	114.2803	
ZLC	37.5008	112.7142	
BCE	37.7064	112.1447	
MTU	40.1450	110.1269	
OCS	41.5900	109.0144	
SIRLY	41.7392	106.8825	
BFF	41.8942	103.4814	
ZMP	42.4033	99.3500	
ONL	42.4703	98.6864	
JVL	42.6197	89.0389	
ORD	41.9822	87.9056	
2 depart arpt = SAN	arrival aprt = ORD	num_fix =	30
SAN	32.7333	117.1861	
IPL	32.7486	115.5075	
BZA	32.7700	114.5997	
ZAB	32.7756	114.0000	
MOHAK	32.7756	113.9714	
PXR	33.4439	111.9722	
BOLIC	34.0278	110.3517	
VERNO	34.2569	109.6214	

SJN	34.5208	109.3778
LAVAN	34.9083	107.3417
ABQ	35.0417	106.6056
LVS	35.6539	105.1417
ZKC	37.1586	102.2739
DRAWL	37.4853	101.6167
GCK	37.9300	100.7250
SLN	38.7914	97.6500
AGENT	39.6197	94.7925
KIDER	39.7678	94.1808
IRK	40.0922	92.5417
COLIE	40.2806	92.1836
LOAMY	40.4244	91.7839
KEOKK	40.5533	91.4036
ZAU	40.6108	91.2283
BDF	41.2308	89.6156
OWENA	41.3447	89.1939
KELSI	41.4431	89.0219
AHMED	41.5667	88.7717
SHOOZ	41.5544	88.7408
PLANO	41.6647	88.5719
ORD	41.9822	87.9056
1 depart	arpt = SAN	arrival aprt = STL num_fix = 19
SAN	32.7333	117.1861
MZB	32.7819	117.2244
PACIF	33.2858	117.7469
BIGJO	33.3833	117.9833
POM	34.0783	117.7861
DAG	34.8539	116.7861
CLARR	35.6756	115.6786
LAS	36.0797	115.1500
ZDV	37.0778	111.7450
DVC	37.8086	108.9306
HBU	38.4519	107.0389
HLC	39.2500	100.2197
SKC	39.2833	99.1686
ZARDO	39.3025	97.5689
SLOWR	39.3031	97.3817
ANGEY	39.3031	96.6008
MKC	39.1231	94.5917
WELTS	39.0081	91.7708
STL	38.8606	90.4822
1 depart	arpt = EWR	arrival aprt = SAN num_fix = 34
EWR	40.6944	74.1667
RBV	40.2000	74.4800
SUZIE	40.4531	75.9731
RAV	40.5497	76.5797
VALLO	40.6267	77.4383
BURNI	40.6569	77.8039
ZNY	40.6706	77.9761
WEC	40.8253	80.2117
MAINE	40.8931	81.6881

MORES	40.8983	81.8181
GONER	40.9656	84.2008
ZOB	40.9736	84.7008
FWA	40.9697	85.1800
WHETT	41.1600	86.5839
BDF	41.2308	89.6156
YOU DO	41.0542	90.5217
BURKK	40.9692	91.2308
ALBERT	40.8414	92.2283
JAVAS	40.7656	92.7886
ZAU	40.6631	93.5147
LMN	40.5967	93.9672
PWE	40.2000	96.2000
ZMP	39.5961	98.8644
HLC	39.2500	100.2197
PUB	38.2947	104.4292
FMN	36.7483	108.0981
COCAN	36.3125	110.3511
TBC	36.1211	111.2689
EED	34.7500	114.4697
MOMAR	33.5650	115.9345
PILLO	32.7703	116.4687
I-UBR	32.6600	116.8885
SWATT	32.6792	116.9662
SAN	32.7333	117.1861
1 depart arpt = DEN arrival apt = SAN num_fix =		13
DEN	39.8003	104.8867
LAWSN	39.5178	106.4764
DBL	39.4392	106.8939
ZDV	38.6211	109.9833
HVE	38.4167	110.6989
BCE	37.7064	112.1447
BLD	35.9639	114.8514
TNP	34.1294	115.9389
MOMAR	33.5650	115.9345
PILLO	32.7703	116.4687
I-UBR	32.6600	116.8885
SWATT	32.6792	116.9662
SAN	32.7333	117.1861
1 depart arpt = DFW arrival apt = SAN num_fix =		15
DFW	32.8964	97.0333
WORTH	32.8392	99.5994
ABI	32.4697	99.8497
INK	31.7792	103.2028
ZFW	31.8883	103.6228
CONNE	31.9339	105.3289
EWM	31.9497	106.2697
SSO	32.2692	109.2622
BXK	33.4250	112.6806
DECAS	33.8233	115.4558
MOMAR	33.5650	115.9345
PILLO	32.7703	116.4687

I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = IAH	arrival aprt = SAN	num_fix = 12
IAH	29.9497	95.3297	
FST	30.9167	102.9167	
FIGMO	31.5908	105.3819	
ELP	31.8072	106.3861	
SSO	32.2692	109.2622	
BXK	33.4250	112.6806	
DECAS	33.8233	115.4558	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = IAD	arrival aprt = SAN	num_fix = 13
IAD	38.9436	77.4528	
IHD	39.9742	79.3586	
CAP	39.8919	89.6253	
IRK	40.0922	92.5417	
GLD	39.3800	101.6800	
DVC	37.8086	108.9306	
PGS	35.6197	113.5300	
TNP	34.1294	115.9389	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = MSP	arrival aprt = SAN	num_fix = 16
MSP	44.8842	93.2139	
FSD	43.5786	96.7389	
ONL	42.4703	98.6864	
DEN	39.8003	104.8867	
LAWSN	39.5178	106.4764	
DBL	39.4392	106.8939	
ZDV	38.6211	109.9833	
HVE	38.4167	110.6989	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
TNP	34.1294	115.9389	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = ORD	arrival aprt = SAN	num_fix = 16
ORD	41.9822	87.9056	
JOT	41.5461	88.3183	
MZV	41.3208	90.6378	
DEN	39.8003	104.8867	

LAWSN	39.5178	106.4764	
DBL	39.4392	106.8939	
ZDV	38.6211	109.9833	
HVE	38.4167	110.6989	
BCE	37.7064	112.1447	
BLD	35.9639	114.8514	
TNP	34.1294	115.9389	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = JFK	arrival aprt = SAN	num_fix = 14
JFK	40.6197	73.7697	
RAV	40.5497	76.5797	
PUB	38.2947	104.4292	
FMN	36.7483	108.0981	
COCAN	36.3125	110.3511	
TBC	36.1211	111.2689	
ZDV	36.0292	111.7083	
PGS	35.6197	113.5300	
TNP	34.1294	115.9389	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	
SAN	32.7333	117.1861	
1 depart	arpt = MIA	arrival aprt = SAN	num_fix = 25
MIA	25.8000	80.2833	
NEPTA	28.6108	87.6433	
SANTI	28.8519	88.6675	
LEV	29.1700	90.0997	
PEKON	29.6361	92.9175	
WEEVE	29.8397	94.4594	
IAH	29.9497	95.3297	
PUFER	30.2144	97.0989	
AUS	30.2983	97.7000	
SPURS	30.3936	98.3514	
JCT	30.5083	99.7667	
KEMPL	30.7200	100.8314	
ZHU	30.8789	102.2603	
FST	30.9167	102.9167	
FIGMO	31.5908	105.3819	
ELP	31.8072	106.3861	
ALIBY	31.9214	107.7789	
SSO	32.2692	109.2622	
BXK	33.4250	112.6806	
DECAS	33.8233	115.4558	
MOMAR	33.5650	115.9345	
PILLO	32.7703	116.4687	
I-UBR	32.6600	116.8885	
SWATT	32.6792	116.9662	

SAN	32.7333	117.1861		
1 depart	arpt = DTW	arrival aprt = SAN	num_fix =	21
DTW	42.2186	83.3472		
DUNKS	42.4272	84.1942		
ALPHE	42.4353	84.4967		
ZOB	42.4472	85.0000		
PMM	42.4653	86.1058		
DBQ	42.4028	90.7083		
ZAU	42.5539	93.0978		
FOD	42.6000	94.2800		
ONL	42.4703	98.6864		
ZMP	42.3581	99.3122		
CYS	41.2000	104.7697		
EKR	40.0700	107.9200		
ZDV	39.2636	110.0236		
BCE	37.7064	112.1447		
BLD	35.9639	114.8514		
TNP	34.1294	115.9389		
MOMAR	33.5650	115.9345		
PILLO	32.7703	116.4687		
I-UBR	32.6600	116.8885		
SWATT	32.6792	116.9662		
SAN	32.7333	117.1861		
1 depart	arpt = BOS	arrival aprt = SAN	num_fix =	17
BOS	42.3500	70.9800		
CAM	42.9797	73.3297		
SYR	43.1497	76.2000		
DEN	39.8003	104.8867		
LAWSN	39.5178	106.4764		
DBL	39.4392	106.8939		
ZDV	38.6211	109.9833		
HVE	38.4167	110.6989		
BCE	37.7064	112.1447		
ZLC	37.5008	112.5983		
BLD	35.9639	114.8514		
TNP	34.1294	115.9389		
MOMAR	33.5650	115.9345		
PILLO	32.7703	116.4687		
I-UBR	32.6600	116.8885		
SWATT	32.6792	116.9662		
SAN	32.7333	117.1861		
1 depart	arpt = BNA	arrival aprt = SAN	num_fix =	20
BNA	36.1197	86.6700		
MEM	35.0497	89.9697		
ZME	35.0200	89.8400		
KLUBB	35.1200	95.4667		
DWINE	35.2025	96.1686		
IRW	35.3583	97.6089		
SERTS	35.3542	98.8689		
ZFW	35.3333	100.0000		
AMA	35.2872	101.6386		
TCC	35.1800	103.6028		

ABQ	35.0417	106.6056		
ZUN	34.9500	109.1500		
PYRIT	34.8694	110.5106		
DRK	34.7025	112.4794		
PKE	34.1000	114.6700		
MOMAR	33.5650	115.9345		
PILLO	32.7703	116.4687		
I-UBR	32.6600	116.8885		
SWATT	32.6792	116.9662		
SAN	32.7333	117.1861		
1 depart	arpt = SLC	arrival appt = SAN	num_fix =	12
SLC	40.8500	111.9697		
MLF	38.4267	113.0111		
GEGEE	37.9664	113.3303		
BERYL	37.9000	113.3847		
NORRA	36.7592	114.2803		
OVETO	36.4606	114.5069		
TNP	34.1294	115.9389		
MOMAR	33.5650	115.9345		
PILLO	32.7703	116.4687		
I-UBR	32.6600	116.8885		
SWATT	32.6792	116.9662		
SAN	32.7333	117.1861		

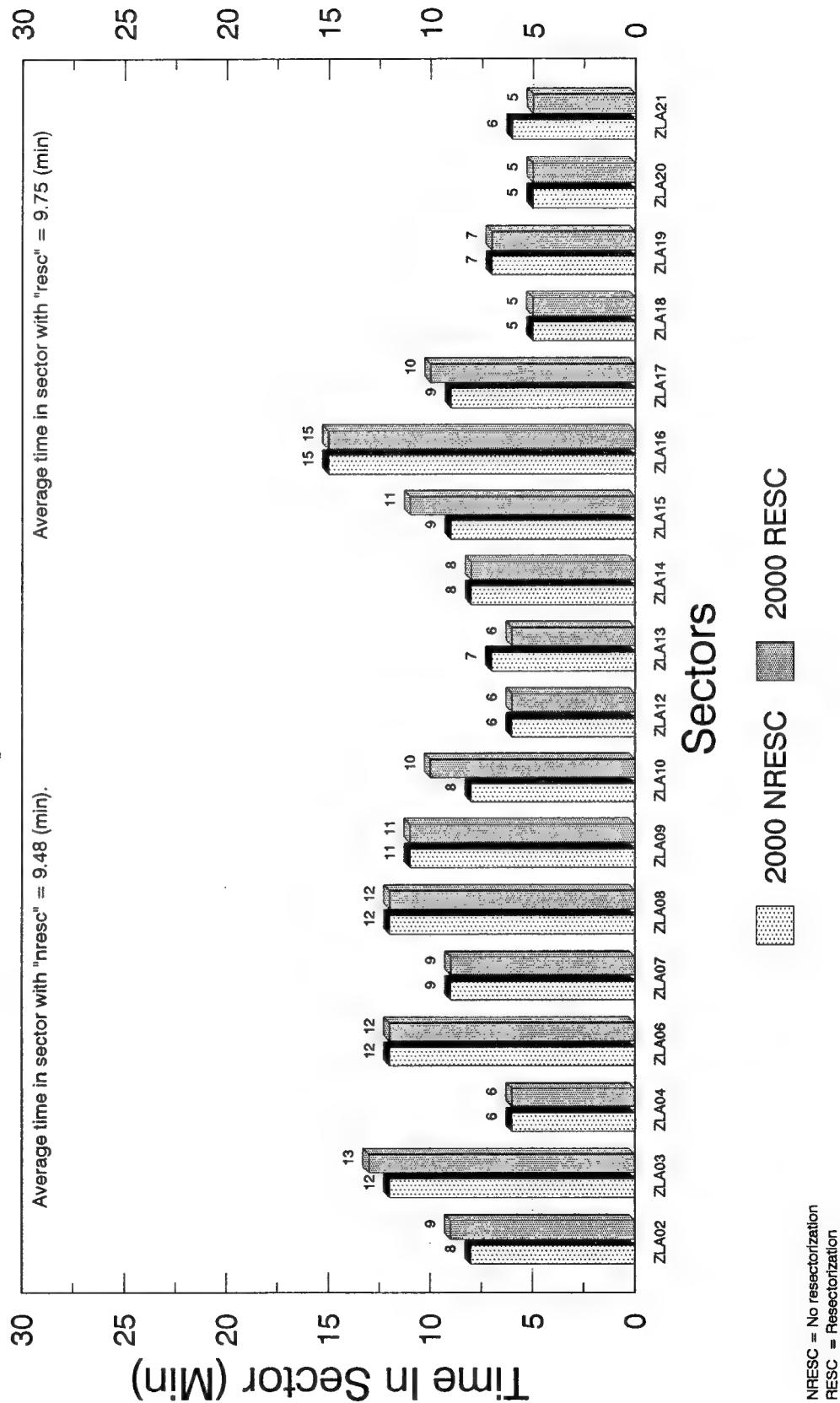
APPENDIX C
RESULTS IN GRAPHICAL FORM

This appendix shows the results presented in section 4 graphically. The plotted values are exact, and may not precisely match the rounded values presented throughout this report.

ZLA Sector Crossing Times

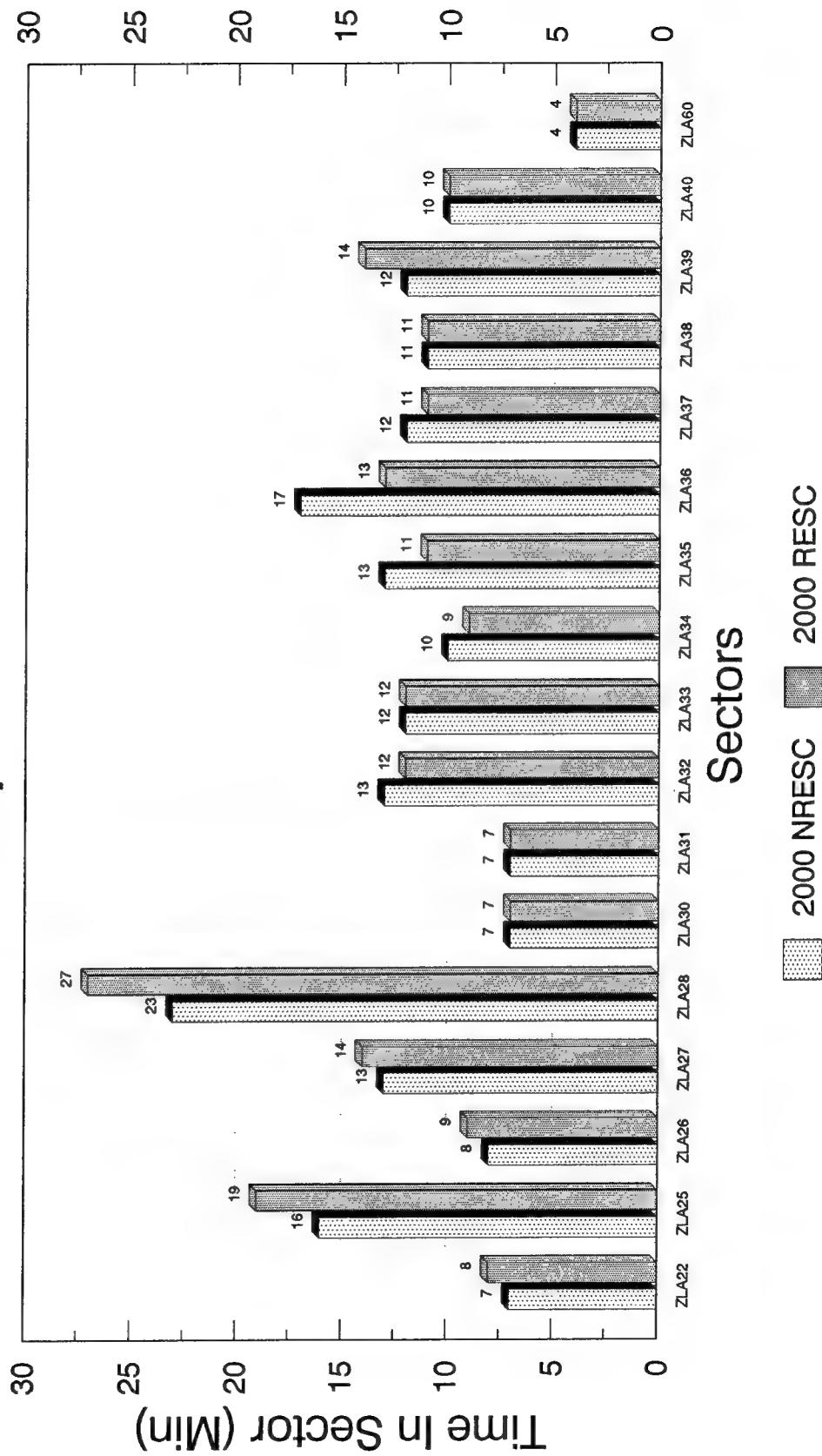
May 16, 2000 (100% VMC)

Graph 1 of 2



NRESC = No resectorization
RESC = Resectorization

ZLA Sector Crossing Times (Continue)
 May 16, 2000 (100% VMC)
 Graph 2 of 2

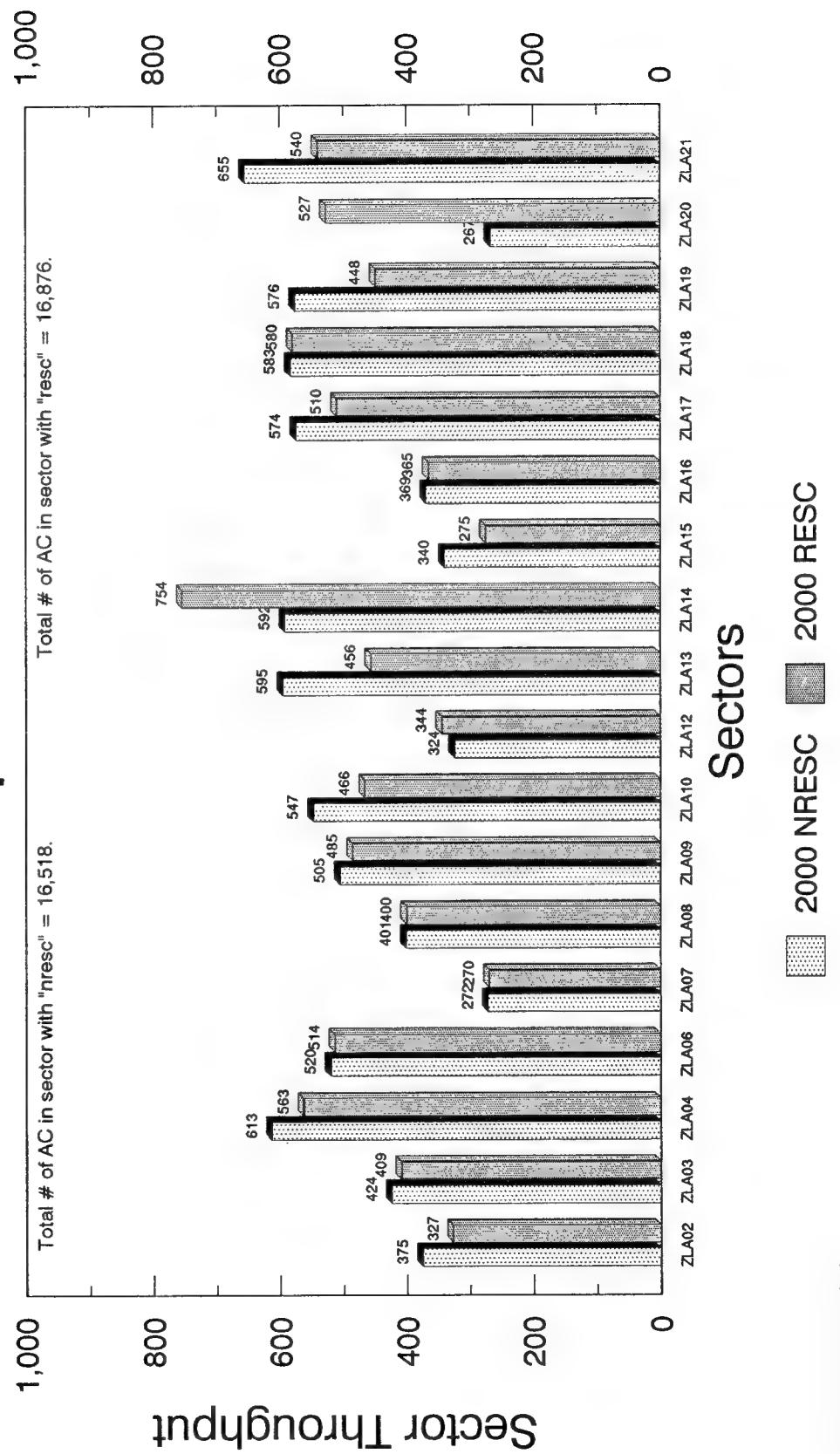


NRESC = No resectorization
 RESC = Resectorization

ZLA Sector Load

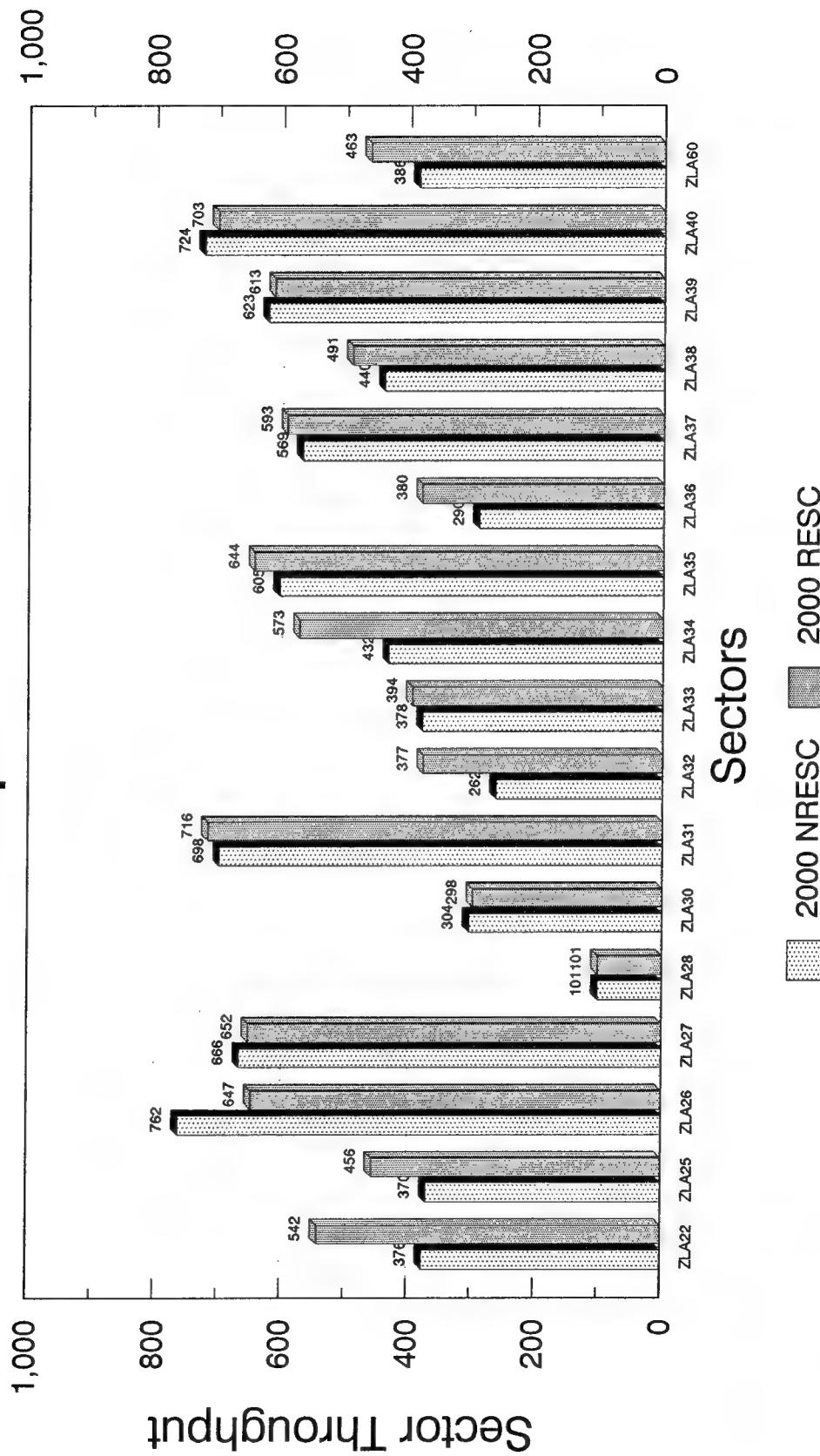
May 16, 2000 (100% VMC)

Graph 1 of 2



NRESC = No resectorization
RESC = Resectorization

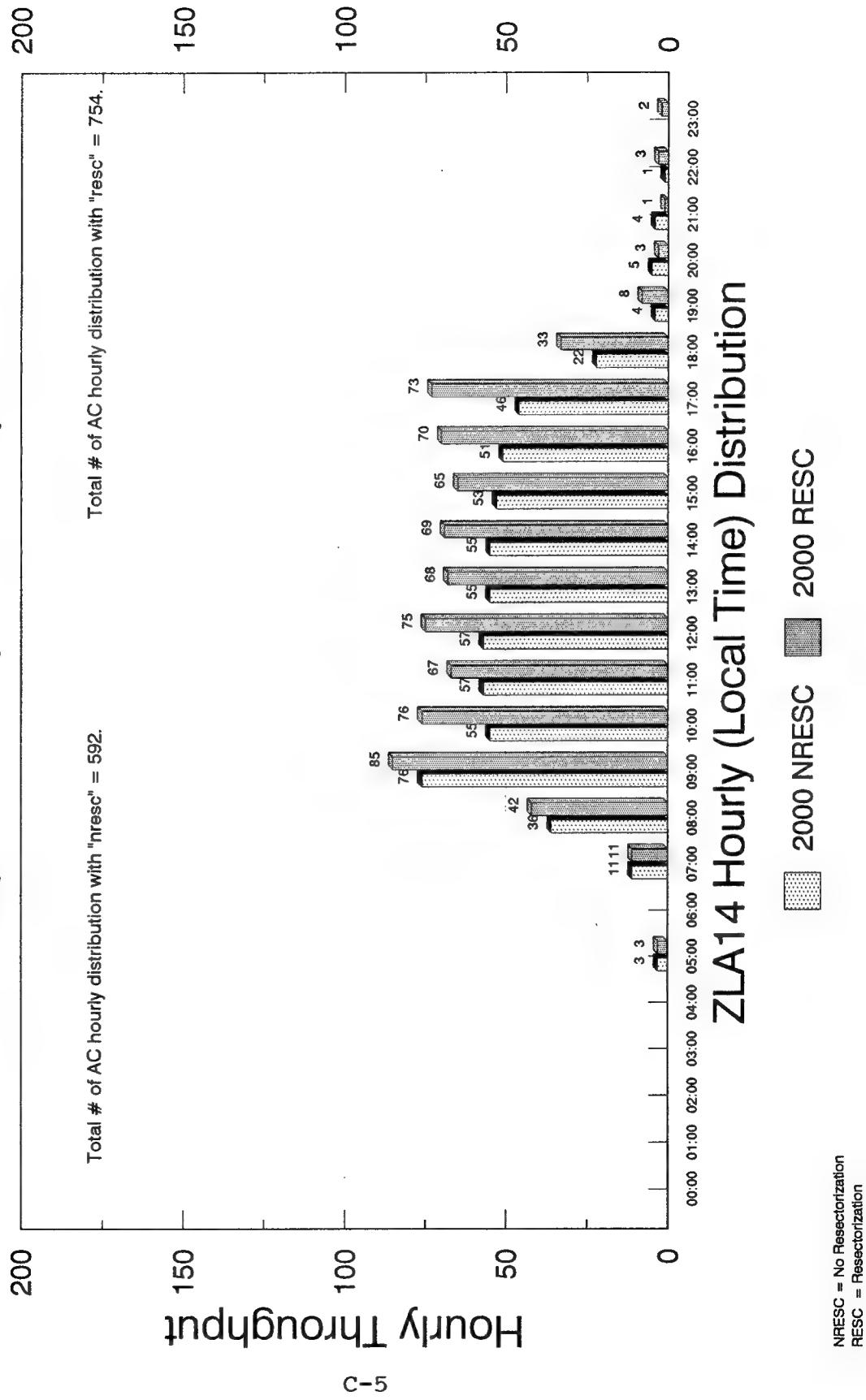
ZLA Sector Load (Continue)
May 16, 2000 (100% VMC)
Graph 2 of 2



NRESC = No resectorization
 RESESC = Resectorization

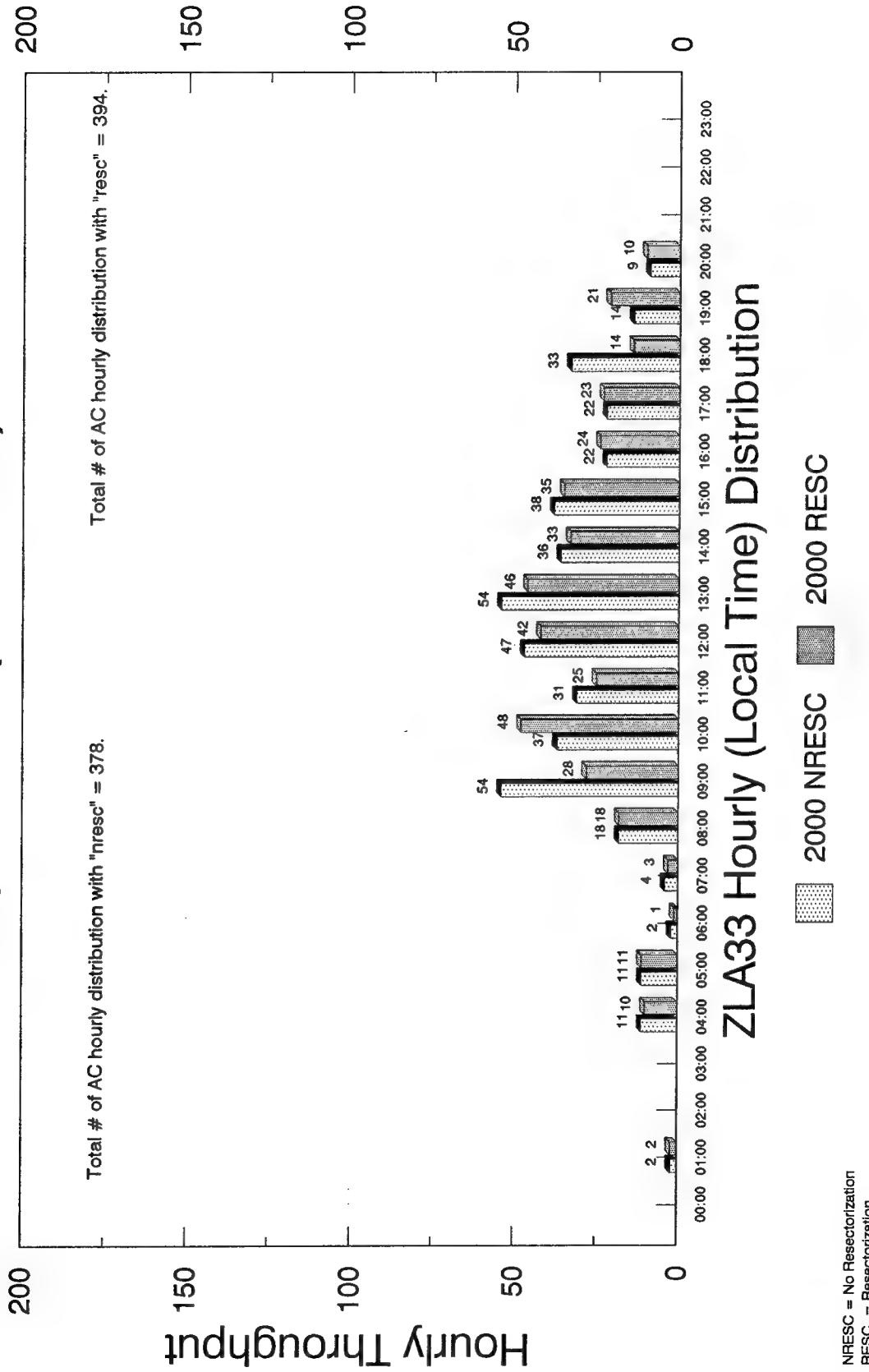
ZLA14 With And Without Resectorization

May 16, 2000 (100% VMC)



ZLA33 With And Without Resection

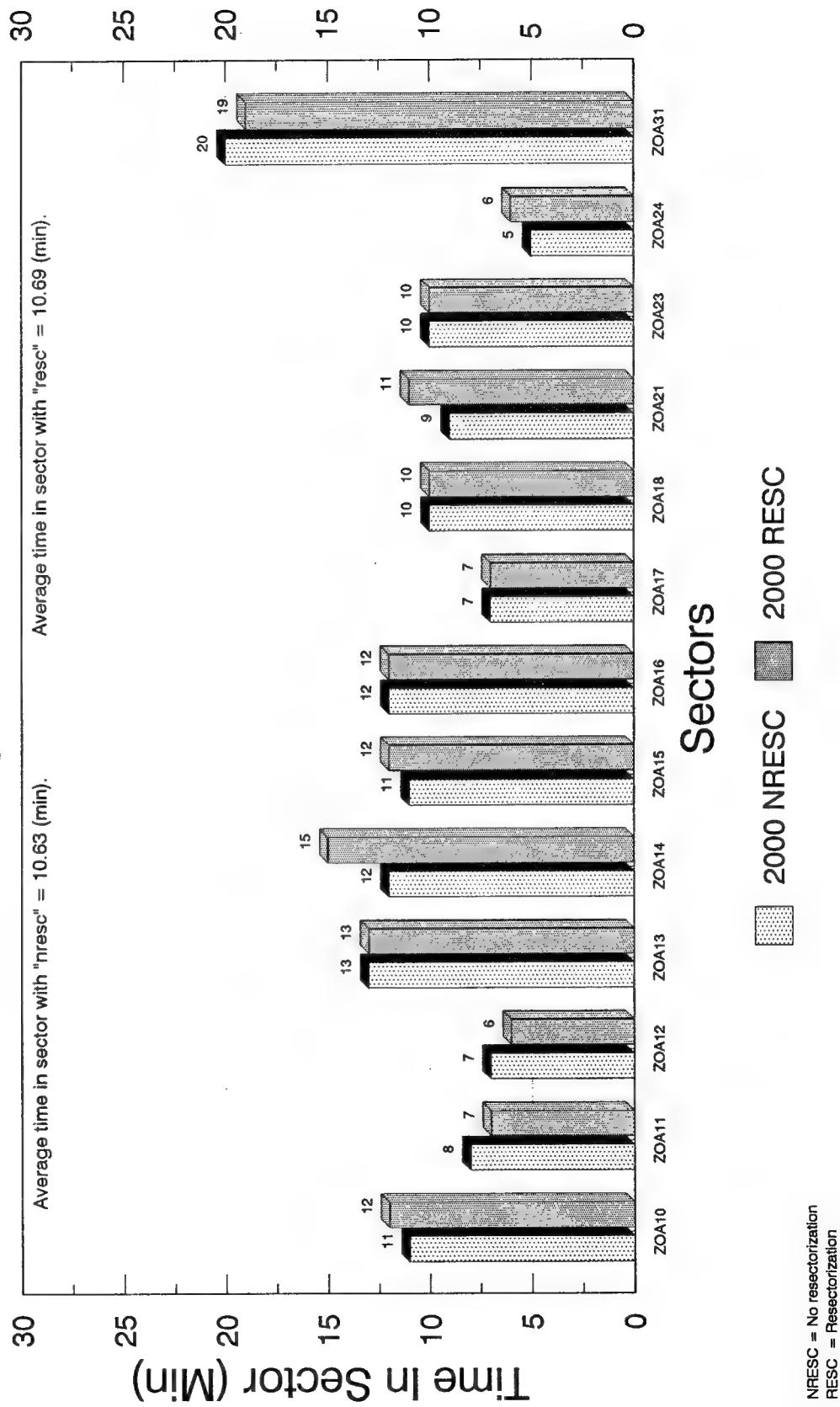
May 16, 2000 (100% VMC)



ZOA Sector Crossing Times

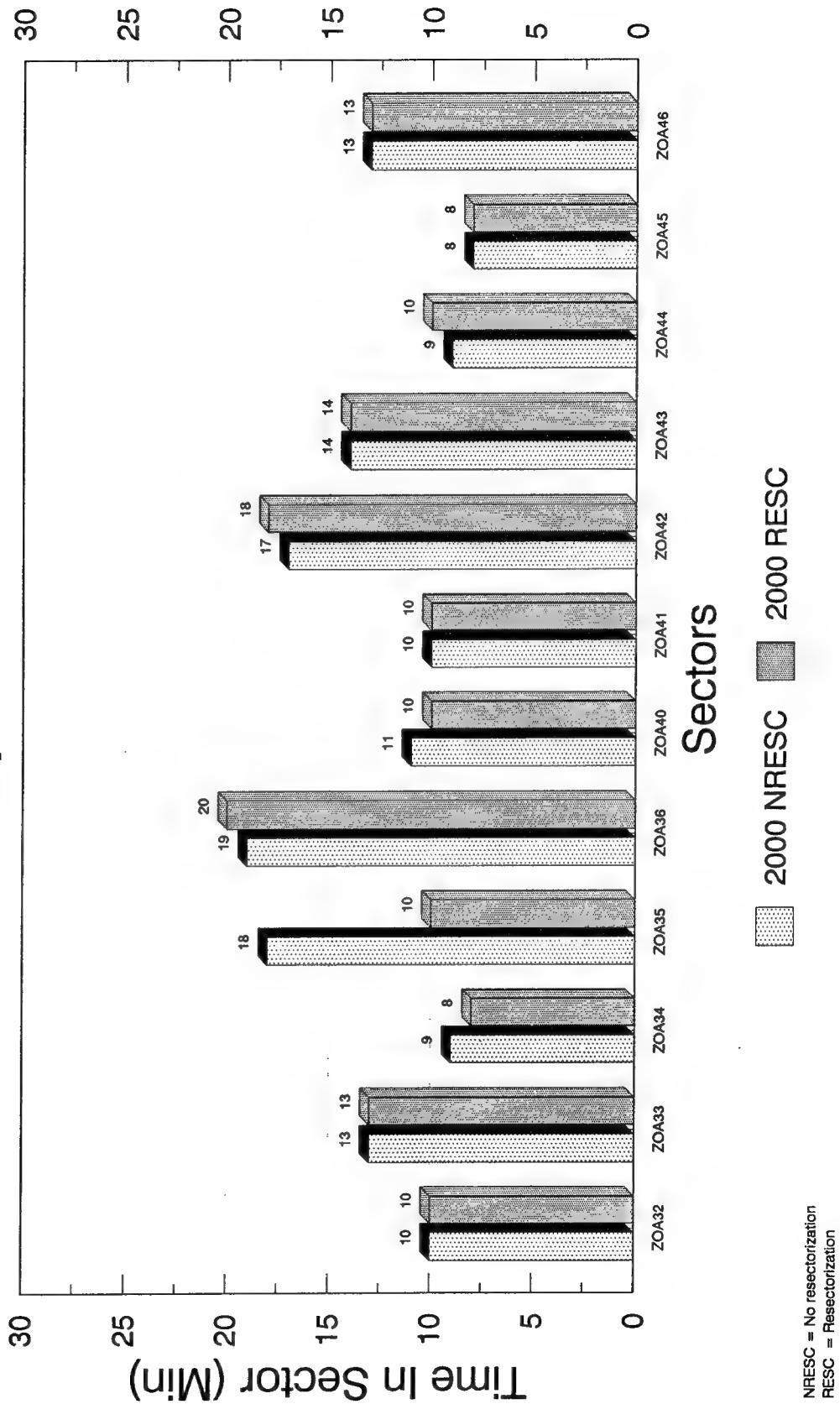
May 16, 2000 (100 % VMC)

Graph 1 of 2



NRESC = No resectorization
RESC = Resectorization

ZOA Sector Crossing Times (Continue)
May 16, 2000 (100 % VMC)
Graph 2 of 2

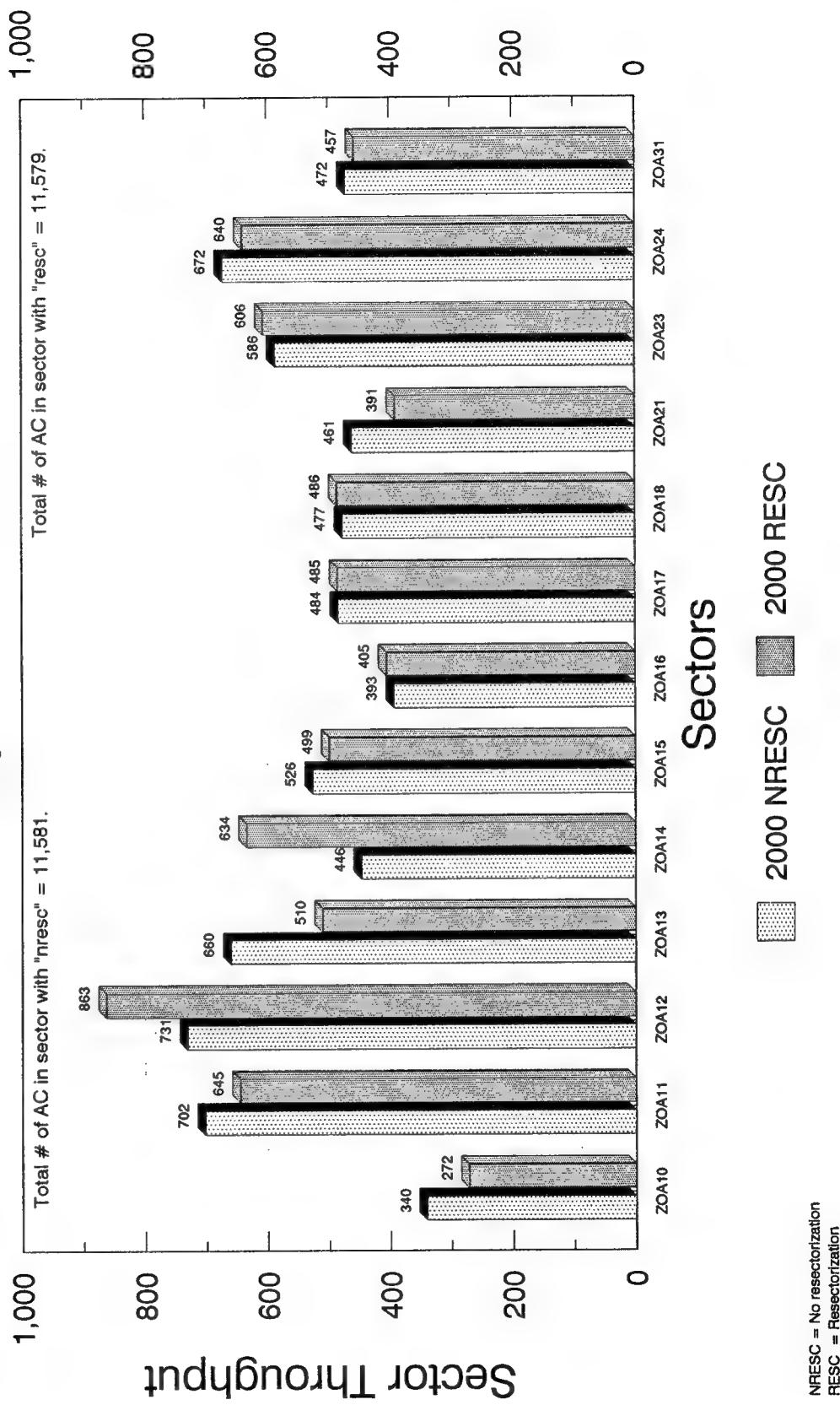


NRESC = No resectorization
RESC = Resectorization

ZOA Sector Load

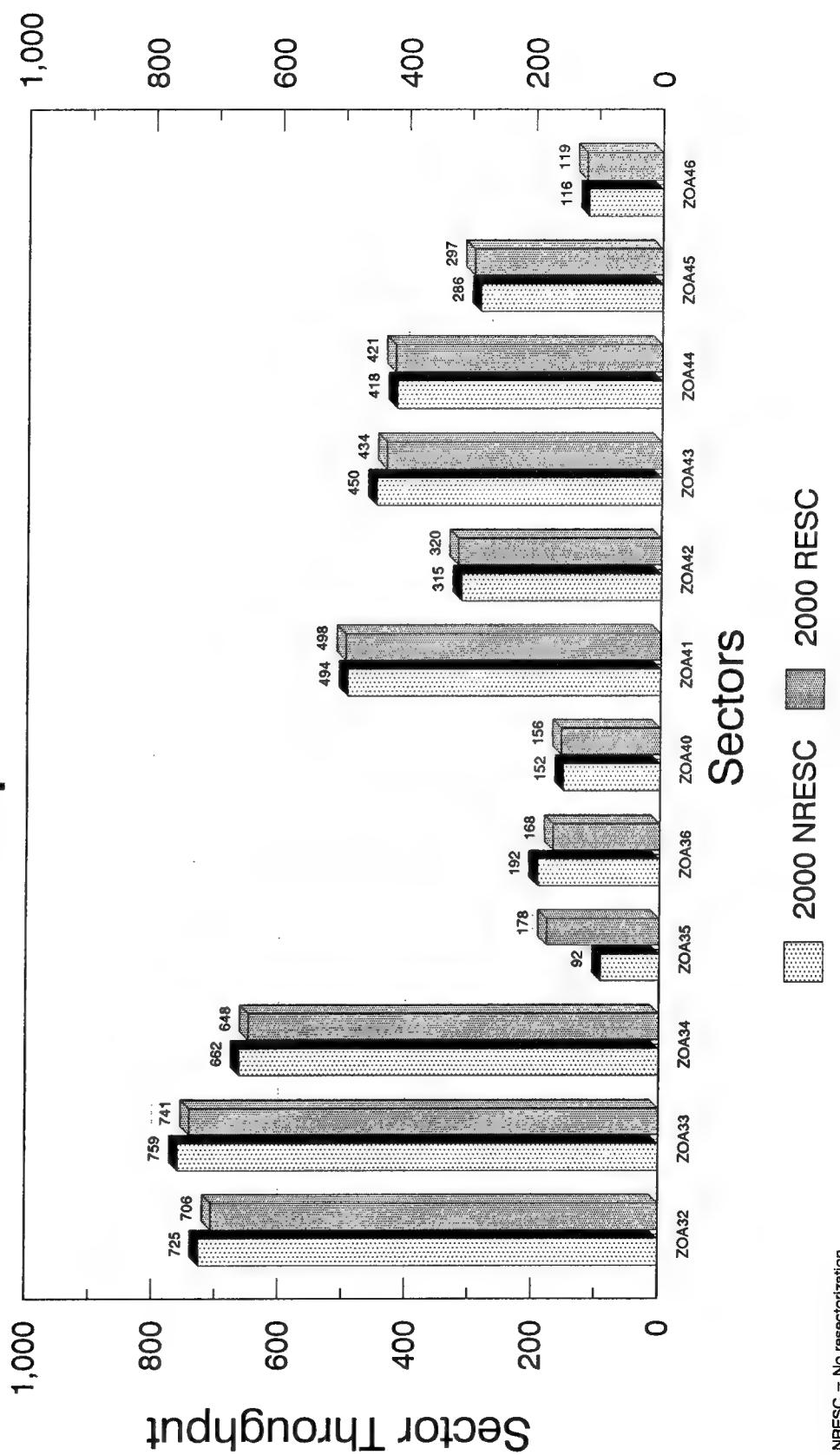
May 16, 2000 (100% VMC)

Graph 1 of 2



NRESC = No resectorization
RESC = Resectorization

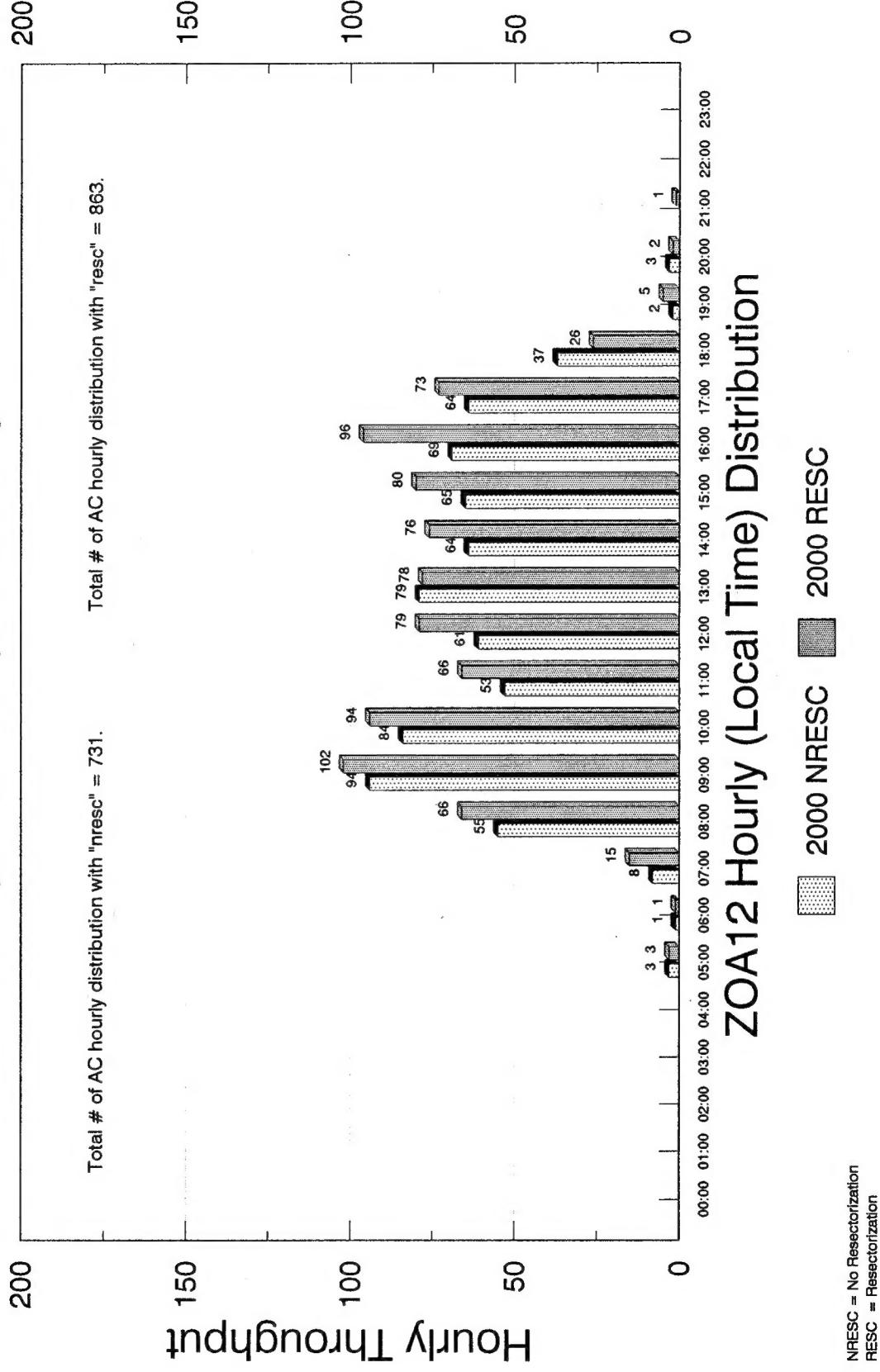
ZOA Sector Load (Continued)
May 16, 2000 (100% VMC)
Graph 2 of 2



NRESC = No resectorization
RESC = Resectorization

ZOA12 With And Without Resection

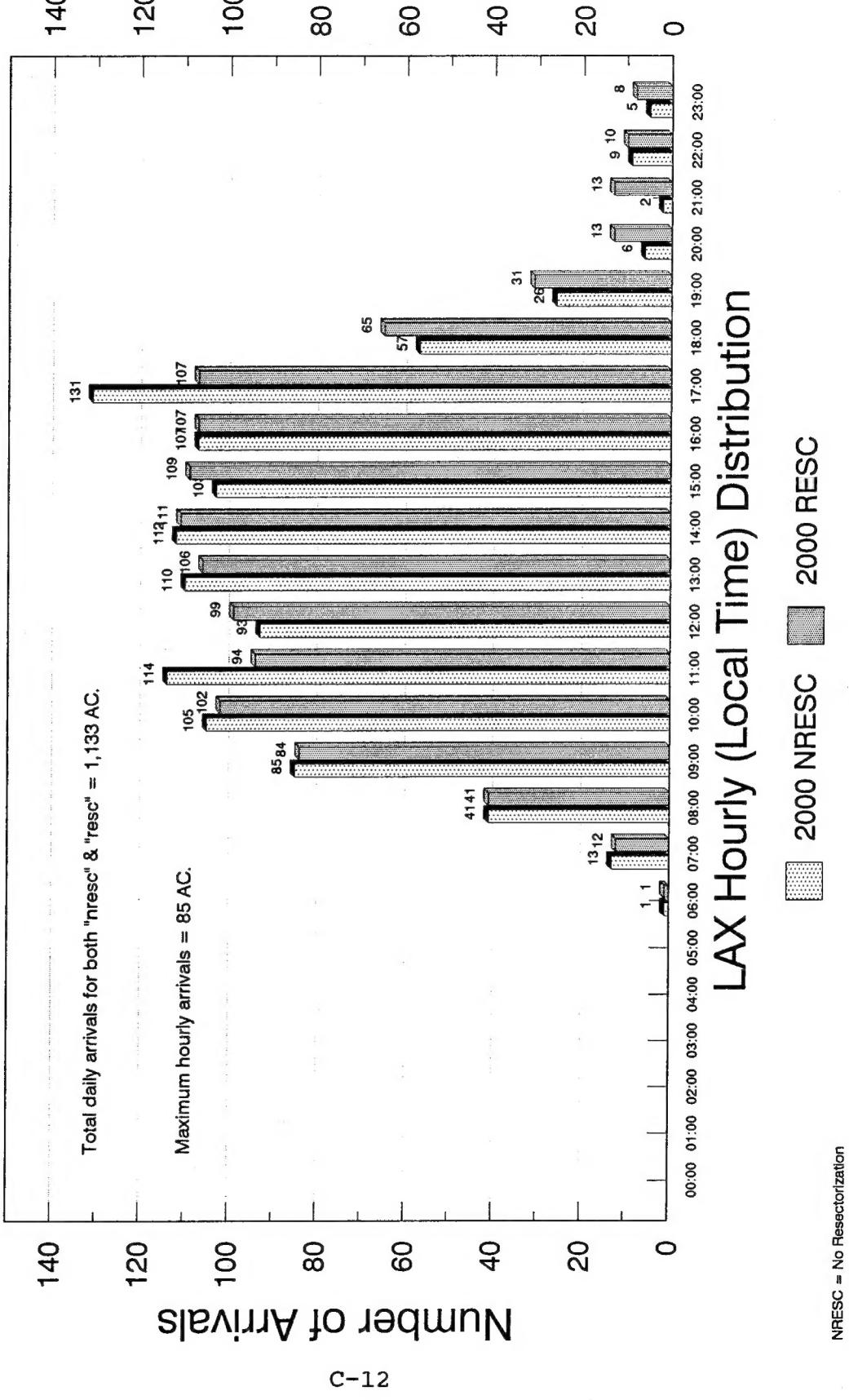
May 16, 2000 (100% VMC)



NRESC = No Resection
RESC = Resection

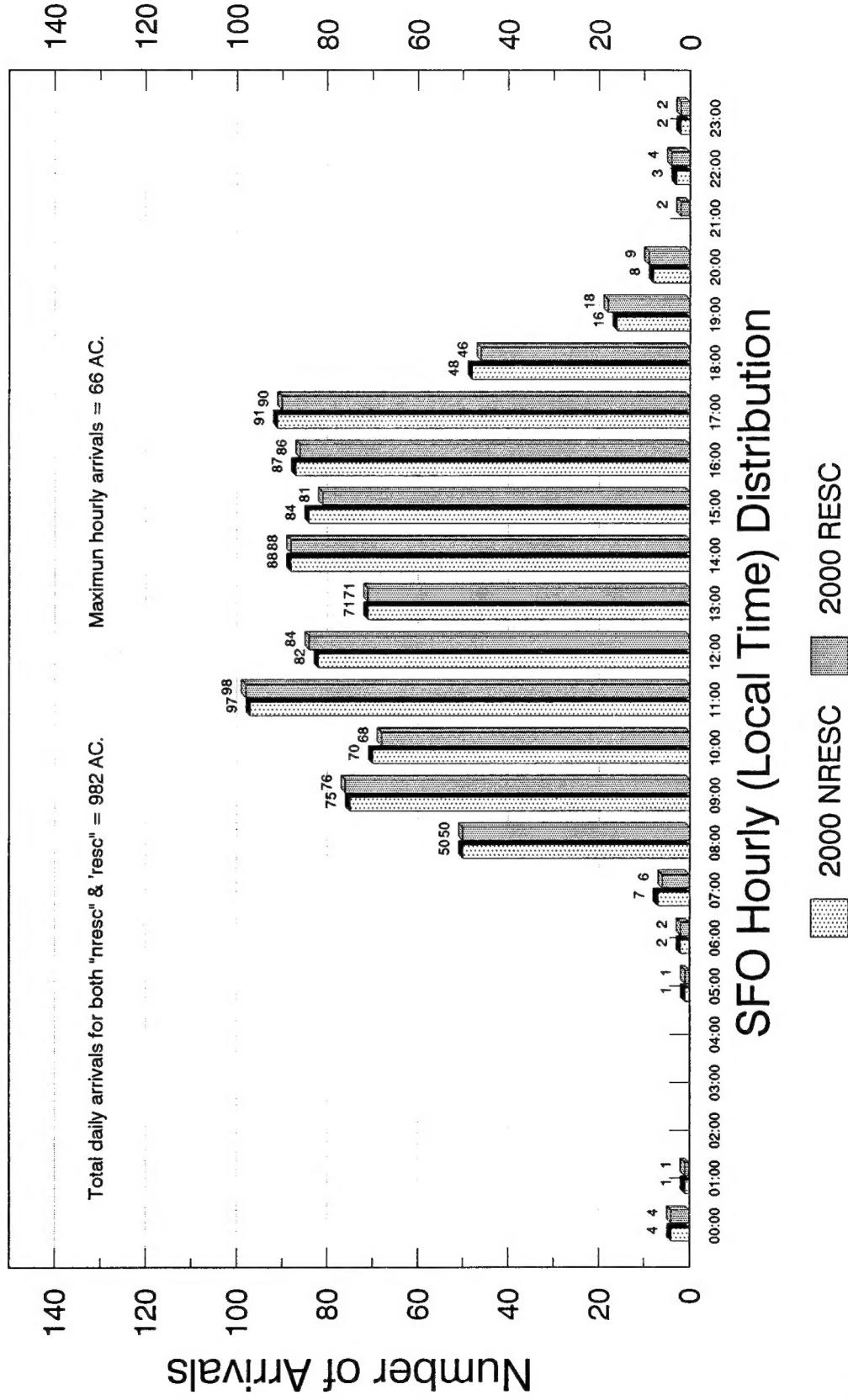
LAX Arrivals With And Without Resectorization

May 16, 2000 (100% VMC)



SFO Arrivals With And Without Resectorization

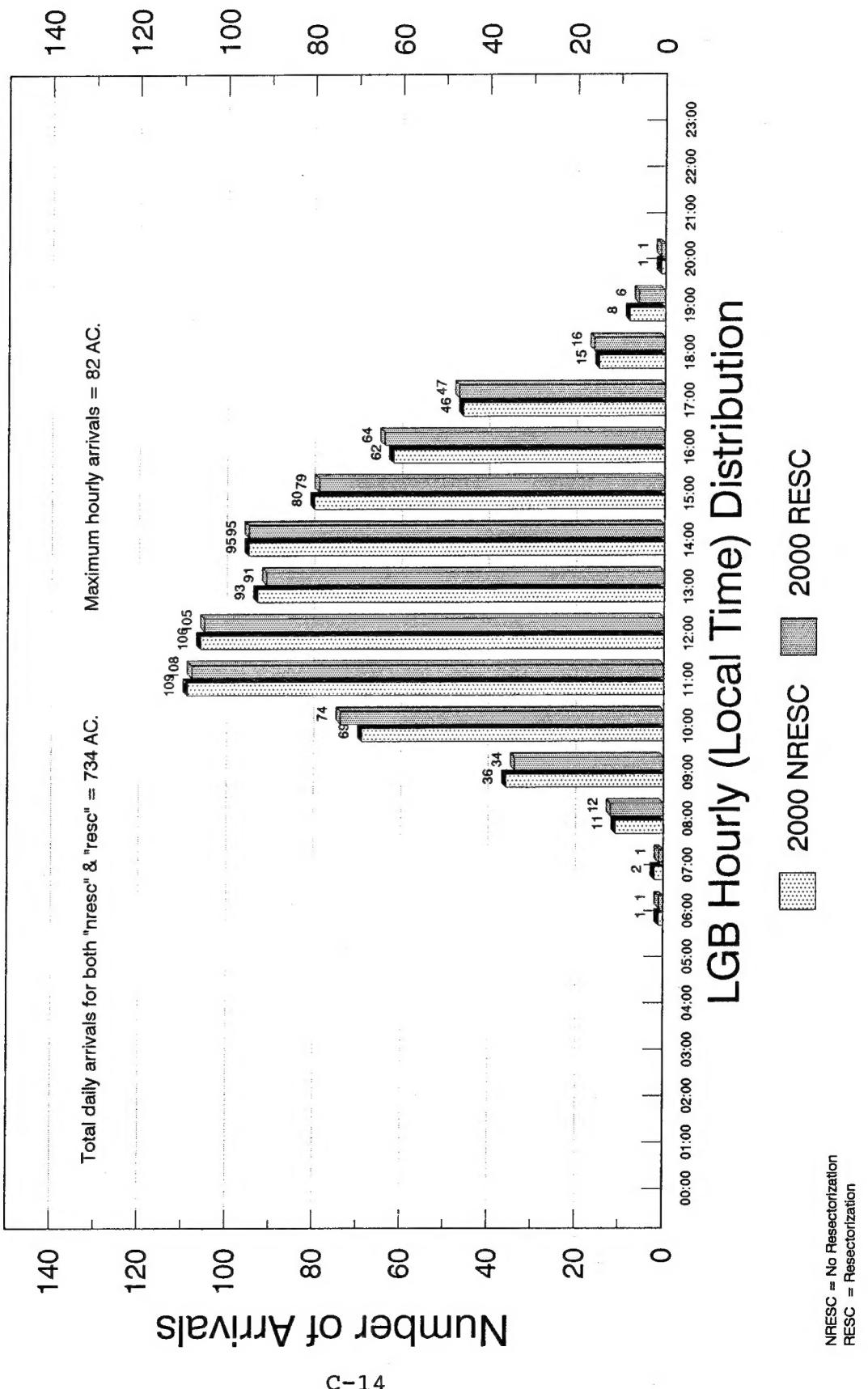
May 16, 2000 (100% VMC)



NRESC = No Resectorization
RESC = Resectorization

LGB Arrivals With And Without Resectorization

May 16, 2000 (100% VMC)



NRESC = No Resectorization
RESC = Resectorization